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DEPARTMENT OF DEFENSE
ELECTROMAGNETIC COMPATIBILITY ANALYSIS CENTER
ANNAPOLIS, MARYLAND 21402-5064

**ELECTROMAGNETIC COMPATIBILITY (EMC)
STANDARDS HANDBOOK**



Prepared by
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IIT Research Institute
Under Contract to
Department of Defense

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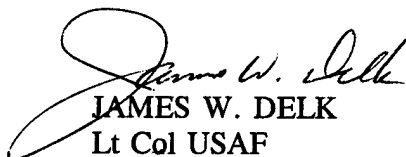


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FROM: IS/R. Larson

13 Jan 95

SUBJ: Distribution of ECAC-HDBK-94-088, *EMC Standards Handbook*

TO: Distribution

1. Attached is your copy of ECAC-HDBK-94-088 entitled *EMC Standards Handbook* and dated July 1994. This handbook is issued as a DOD Electromagnetic Compatibility Analysis Center (ECAC) document since it was completed prior to the transition of ECAC to the DoD Joint Spectrum Center (JSC).
2. The subject document supersedes ECAC-HDBK-86-043 entitled *EMC Standards Handbook* and ECAC-HDBK-86-005 entitled *Radiation Hazards Handbook*, previously published by ECAC. The handbook will be updated periodically, as appropriate.
3. The handbook can be used by the DoD and the EMC community as a reference source for obtaining information on over 500 EMC-related standardization documents. It contains a brief description and status (as of July 1994) of many of the EMC related standardization documents most often used by the DoD, U.S. Government Agencies and industry. The handbook also includes information on foreign, NATO, and international EMC related documents. In addition, the handbook provides a cross reference index so that military, industry and other types of documents can be related by subject or located by numerical identification.
4. The EMC-related specification information provided in the handbook should be helpful in selecting documents for definition of EMC requirements in procurement packages that must comply with the DoD Memorandum of 29 June 1994 by Secretary of Defense William Perry. This memorandum is entitled *Specifications and Standards - A New Way of Doing Business*. This memorandum curtails the use of military specifications/standards in future DoD procurements and requires the use of performance specifications/standards or non-government standards wherever possible.
5. Questions, comments and suggestions for improving the usefulness of this handbook are desired and should be referred to the DoD Joint Spectrum Center, Attn: IS/Mr. Clifford Wienk, DSN 281-4956 or commercial (410) 573-4956 or to DRC/W. Carter, DSN 281-2411 extension 7396 or commercial (410) 573-7396.


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On 28 September 1994, the Electromagnetic Compatibility Analysis Center (ECAC) was subsumed into the new Joint Spectrum Center (JSC). The JSC serves as the Department of Defense focal point for electromagnetic spectrum management matters and provides planning, acquisition, training and operational activities support to the Unified Commands, Military Departments and Defense Agencies. The mission of the JSC is to ensure the DoD's effective use of the electromagnetic spectrum in support of national security and military objectives. The Center receives policy guidance from the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (ASD C3I) and operational guidance from the Chairman, Joint Chiefs of Staff (CJCS) through the J6. The JSC provides support including the development, maintenance, and distribution of Electromagnetic Environmental Effects (E3) databases and analysis models. Specific project support to DoD components and the US Government is provided through a sponsor-funded program.

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SECTION 1

INTRODUCTION

1.1 BACKGROUND

The development, deployment, and operation of DoD communications-electronics (C-E) systems require adherence to numerous development standards and to various operationally oriented standards, specifications, and regulations. Depending upon the complexity of the system or equipment, the number of applicable standards could reach into the hundreds. Without exception, if the system or equipment is designed to transmit and/or receive, some of these standards, as well as specifications and regulations, will relate in some way to the electromagnetic compatibility (EMC) of the device functioning in its operational environment. In addition, many electric/electromechanical/electronic systems or equipments that are not designed to transmit or receive electromagnetic energy also emit extraneous signals or may be susceptible to signals radiated by equipment in the electromagnetic environment (EME).

Some standards and related documents are readily recognized by the use of the term electromagnetic compatibility, either in their titles or prominently in their texts. Standards, specifications, and handbooks devoted entirely to EMC are designated as EMC standards (EMCS) in the Department of Defense Index of Specifications and Standards (DoDISS) and are therefore easily identified.

The ECAC engineer often advises developers concerning standards and specifications that can be incorporated into Requests for Proposals (RFPs) and into Contract Specifications. This handbook catalogues these standards and specifications, along with brief descriptions, to help the engineer determine their applicability to the task being undertaken.

1.2 OBJECTIVE

The purpose of this handbook is to index and summarize characteristics of EMC-related standards, specifications, handbooks, and regulations for use by ECAC project engineers. It also provides background information on the DoD EMC program.

1.3 ORGANIZATION OF HANDBOOK

Section 2 lists basic EMC standardization documents, including directives/instructions, that are most commonly used by the DoD and the EMC community. The documents included in this section are exclusively related to EMC, and have been developed/updated under the DoD electromagnetic compatibility program (EMCP).

Section 3 lists standardization documents used by the DoD in acquisition, procurement, and engineering management that are related to component equipment/system design and may call out EMC-related requirements. This section includes DoD directives and instructions and DoD and military standards, specifications, and handbooks.

Section 4 lists EMC standardization documents issued by each military department for internal use. These documents are listed by military department and the specific systems commands within the departments. The documents include regulations, procedures, bulletins, and other types of documents pertaining to EMC.

Section 5 lists standardization documents that provide interoperability/performance standards for tactical and long-haul telecommunications systems. Other documents in this section are technical design standards, facility design standards, and handbooks that address EMC and electromagnetic pulse (EMP) requirements. Documents in this section include standards and handbooks that are prepared under the direction of the Defense Information Systems Agency (DISA) and the Defense Nuclear Agency (DNA). The characteristics of systems/facilities provided in this section seldom include EMC requirements, but provide information required for an EMC analysis when these systems are encountered in a project.

Section 6 lists standardization documents that are developed by non-DoD departments of the US Government. The documents include standards, rules, regulations, procedures, and handbooks that directly address EMC or EMC-related topics.

Section 7 lists standardization documents developed/coordinated voluntarily by industrial, professional, and scientific organizations in the US that address EMC or EMC-related topics. The documents include standards, manuals, recommended practices, measurement procedures, and criteria that have been developed to achieve EMC for electric, electromechanical, and electronic equipments/systems.

Section 8 lists foreign national standards that address EMC and EMC-related topics. Also listed in this section are standard agreements (STANAG) used by the North Atlantic Treaty Organization (NATO) to achieve EMC within NATO forces. These NATO STANAGs are generally developed from appropriate EMC standardization documents of member nations.

Section 9 lists international standardization documents that address EMC or EMC-related topics. Standards of the following organizations are included:

- International Electrotechnical Commission (IEC)
- International Special Committee on Radio Interference (CISPR)
- International Organization for Standardization (ISO)
- International Radio Consultative Committee (CCIR)¹
- International Telegraph and Telephone Consultative Committee (CCITT)¹
- European Union (EU), formerly known as the European Economic Community (EEC)

¹ The standards-setting activities of the CCITT and CCIR have been consolidated into a telecommunications Standardization Sector. The rest of the CCIR activities - essentially those tasks related to the efficient management of the RF spectrum in terrestrial and space radio communications - has been integrated into a new Radiocommunication Sector along with the activities of the International Frequency Registration Board (IFRB).

1.4 STANDARDS, SPECIFICATIONS, HANDBOOKS, AND REGULATIONS

Technical standards constitute a body of good engineering practices in the subject area concerned. They are generated primarily under the auspices of the US Department of Defense (DoD), non-DoD government agencies, national civilian engineering societies, and international organizations as well as foreign governments. Nongovernment entities promulgate "voluntary" standards (i.e., those without legal authority). Some of these eventually achieve legal status through international treaty agreements. Some are adopted as government (DoD and non-DoD) standards. EMC standards are often developed separately to serve unique military needs; they form the main thrust of this handbook.

Because technical standards represent good engineering practices, many are cited as broad technical requirements for contracts and thus achieve legal status for the specific applications concerned. For this reason, they are sometimes confused with technical specifications that are intended to be used as contractual requirements. These technical specifications generally embody narrower, more-detailed requirements for specific applications. Two classes of specifications exist: those that impose performance requirements, and those that impose construction requirements. Specifications listed here fall mainly in the performance requirements category.

Although standards and specifications detail requirements to be met, they do not tell the user how to meet them. Handbooks help to fill this void by providing generalized technical design data and guidance.

EMC regulations have legal status and are used by government agencies to control undesired electromagnetic (EM) interactions. The Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA) regulate radio communications and related services. The FCC regulates systems in the civil sector, including state governments, whereas NTIA performs an analogous function for the federal government. FCC and NTIA actions are, of course, coordinated. Other federal agencies also impose special requirements. For example, maximum permissible RF exposure levels for workers are set by the Occupational Safety and Health Administration (OSHA).

1.5 APPLICATION OF EMC STANDARDS AND REGULATIONS

EMC standards are applied to:

- Ensure that various portions of a system operate without electromagnetic interference to any other portion of the same system (intrasystem electromagnetic compatibility)
- Ensure that different systems operate without electromagnetic interference to each other (intersystem electromagnetic compatibility)
- Ensure that a system does not degrade the electromagnetic environment and that it is not degraded by the environment
- Add to the database of measurement EMC data
- Aid in management of the RF spectrum
- Aid cost-effective design of systems, whereby costly retrofit to achieve EMC is unnecessary
- Comply with national and international laws regarding the use of the spectrum
- Ensure that systems/facilities do not cause or are not subjected to radiation hazards in the operational environments.

To the extent that standards and specifications are incorporated into contracts between DoD and industry, their provisions are legally binding upon the contractor (and DoD). Where and when EMC standards are applied is almost obvious from the types of standard involved:

- DoD standards apply to military systems
- Non-DoD government standards and regulations apply throughout the civil federal government
- National standards apply to the nations concerned.

Not so obvious are certain applications to DoD radar systems. For those systems operating between 100 MHz and 100 GHz, MIL-STD-469A applies. This standard has been coordinated with the NTIA radar systems emissions criteria (RSEC). Below 100 MHz, no specific radar standard

exists; the overall EMC standards MIL-STD-461/2/3 apply. Also, sometimes there is confusion concerning when DoD standards or NTIA or FCC regulations apply to a given situation.

For military systems, DoD standards always apply unless some other basis is specifically referenced. Some other basis might be NTIA regulations, voluntary-type standards of professional organizations [Institute of Electrical and Electronics Engineers (IEEE), Society of Automotive Engineers (SAE)], standards of a coordinating body [American National Standards Institute (ANSI)], and standards of other national and international bodies, the North Atlantic Treaty Organization (NATO), or the International Special Committee on Radio Interference (CISPR). On the other hand, NTIA regulations apply to all federal government systems. State government and civil systems abide by regulations of the FCC or may develop their own more stringent regulations, when required.

1.6 DoD POLICY, OBJECTIVES, APPLICATION AND TAILORING OF STANDARDS AND SPECIFICATIONS

DoD policy with respect to the application of standards and specifications has been modified in recent years. Under the new policy, the provisions of standards and specifications are to be tailored for each acquisition. Tailoring is discussed in DoD Instruction 5000.2.¹⁻¹ In tailoring, the individual requirements (sections, paragraphs, or sentences) of the selected specifications and standards are evaluated to determine the extent to which each requirement is most suitable for a specific material acquisition. These requirements are modified where necessary to ensure that each tailored document addresses only the minimum needs of the Government.

For large systems, selected and modified requirements were made a part of a control plan that became a contractual document that supersedes standards and specifications. Thus, tailoring was actually being practiced in the development and design of many large systems. A policy known as *Acquisition Streamlining* was adopted by DoD to promote innovative and cost-effective acquisition

¹⁻¹ Department of Defense Instruction 5000.2, *Defense Acquisition Management Policies and Procedures*, 23 February 1991.

requirements and strategies that will result in the most efficient utilization of resources to produce quality weapons systems and products. To this end, application of the tailoring process by DoD components consists of the following elements:¹⁻²

- Tailoring of all specifications and standards
- Application of those specifications and standards that are mandatory
- Use of Commercial Specifications or Commercial Item Descriptions (CIDs), where practical
- Elimination of automatic chain referencing of specifications and standards
- Application of performance specifications versus how-to specifications
- Maintenance of options on specifications until the latest possible phase in the development/design process.

The importance of the tailoring policy to ECAC project engineers is the decrease in the usefulness of standards as a generic source of EMC requirements, unless access is also available to a permanent record of any given tailoring application.

1.7 DoD POLICY ON ADOPTION OF VOLUNTARY STANDARDS

For many years, DoD has had a policy that encouraged the adoption of non-government organization standards (called voluntary standards) instead of developing new government standards. Now, a concerted effort exists to adopt such standards in order to save money in procurement, and in generating and updating standards (even a modest-sized standard can cost over \$100,000 to produce). The implication of this trend is that voluntary standards are becoming more important due to wider application. Thus, a significant portion of this handbook deals with them.

¹⁻² Department of Defense, Military Handbook, *Acquisition Streamlining*, MIL-HDBK-248B, Washington, DC, 9 February 1989.

1.8 DoD ELECTROMAGNETIC COMPATIBILITY PROGRAM (EMCP)

DoD Directive 3222.3¹⁻³ updates DoD policy on an integrated EMCP to ensure EMC of all military electronic and telecommunications equipments, subsystems, and systems during their conceptual, design, acquisition, and operational phases. The directive assigns specific and joint responsibilities to DoD agencies for leadership in the following EMCP areas:

- Database and analysis capabilities
- Standards and specifications
- Education for EMC
- Design
- Doctrine, tactics, techniques, and procedures
- Operational problems.

The directive provides the following EMCP objectives:

- Achievement of EMC for all electronic and electrical equipments, subsystems, and systems produced and operated by DoD elements
- Attainment of built-in design compatibility instead of after-the-fact remedial measures
- Fostering of common DoD-wide philosophies, approaches, and techniques in the design, production, test, and operation of military communications equipments.

The directive specifies the functions, responsibilities, operational relationships, and fiscal arrangements for the ECAC.

The EMCP is coordinated with other DoD and government agencies concerned with EMC and radiation hazards, such as the Federal Communications Commission (FCC), Federal Aviation Administration (FAA), Environmental Protection Agency (EPA), National Aeronautics and Space

¹⁻³ DoD Directive 3222.3, *Department of Defense Electromagnetic Compatibility Program (EMCP)*, Washington, DC, 20 August 1990.

Administration (NASA), Defense Nuclear Agency (DNA), National Telecommunications and Information Administration (NTIA), National Institute of Standards and Technology (NIST), Bureau of Radiological Health (BRH), and the General Services Administration (GSA). International standardization efforts in the EMC area are also being monitored through participation in NATO and International Electrotechnical Commission standards groups.

Industry is being kept abreast of activities in this program and will continue to be informed of developments and documents in the EMCP through the various industry associations, such as Aerospace Industries Association (AIA), American National Standards Institute (ANSI/C63 and C95), Electronic Industries Association (EIA/G46), Radio Technical Commission for Aeronautics (RTCA), SAE (SAE/AE-4), and the Institute of Electrical and Electronics Engineers (IEEE/S27).

1.9 DoD NONDEVELOPMENTAL ITEM (NDI) PROCUREMENT PROGRAM

In June 1986, the President's Blue Ribbon Commission on Defense Management (the Packard Commission) recommended that:

"Rather than relying on excessively rigid military specifications, the Department of Defense (DoD) should make greater use of components, systems, and services available 'off-the-shelf.' It should develop new or custom made items only when it has been established that those readily available are clearly inadequate to meet military requirements."

The NDI Preference Act of 1987 required the Department of Defense to state requirements for supplies in terms of functions to be performed, performance required, and essential physical characteristics: "defining requirements so that NDI can be procured to fulfill them." The Act required that a preference for nondevelopmental items be established in defense acquisitions.

The 1987 Defense Science Board report, *Military Software*, also recognized the applicability of the NDI approach to the software components of defense systems. It recommended that acquisition contracts be structured so that contractors will be motivated to use existing software in DoD systems.

In October 1990, a handbook¹⁻⁴ addressing the NDI program was issued by the Office of the Assistant Secretary of Defense for Production and Logistics. This report provides a comprehensive description of the NDI program, its advantages, and all aspects of implementation of the program. Reference 1-4 defines a nondevelopmental item as follows:

"Nondevelopmental item is a broad, generic term that covers material available from a wide variety of sources with little or no development effort required by the Government. NDIs include:

- Items obtained from a domestic or foreign commercial marketplace
- Items already developed and in use by the Services, other Defense activities, and government agencies
- Items already developed by foreign governments, which can be supplied in accordance with mutual defense cooperation agreements and Federal and Department of Defense acquisition regulations."

Given the above definition, one can see that the terms *commercial off-the-shelf items* and *nondevelopmental items* are not synonymous. Commercial off-the-shelf items are only one category of what DoD considers NDI.

Reference 1-4 also states that NDI acquisitions offer four major benefits:

- Quick response to operational needs
- Elimination or reduction of research and development costs
- Application of state-of-the-art technology to current requirements
- Reduction of technical, cost, and schedule risks.

Reference 1-4 provides guidance on electromagnetic compatibility for NDI and states that:

"The degree of electromagnetic compatibility compliance of the NDI with military specifications and standards must be ascertained to ensure performance is not degraded in the mission environment."

¹⁻⁴ DoD Nondevelopmental Item Handbook SD-2, *Buying NDI*, October 1990, Office of the Assistant Secretary of Defense for Production and Logistics, Washington, DC, 20301-8000.

The NDI must also be electromagnetically compatible with existing operational equipment and systems. The fact that an NDI may already be accepted in the commercial marketplace does not ensure electromagnetic compatibility requirements are met. When market investigations or testing of an NDI demonstrate that available equipment cannot meet electromagnetic compatibility requirements, several alternatives exist:

- Shielding or isolation of the NDI
- Existing commercial equipment may be modified to meet electromagnetic compatibility requirements
- Existing mission profiles may be reassessed to determine if the commercially demonstrated electromagnetic compatibility values are acceptable.

If electromagnetic compatibility is an extremely critical design characteristic or when the commercial electromagnetic compatibility parameters are inferior to requirements, the NDI strategy may have to be abandoned.

1.10 FSC CODES

The standards/handbooks listed in this handbook fall into several categories of standards listed in the DoD Index of Specifications and Standards (DoDISS). These may be identified by a federal supply classification (FSC) numeric code or alpha symbols designated as an area (AREA). The standards in this section fall into the following classifications:

FSC 1990	Miscellaneous Vessels
FSC 6150	Miscellaneous Electrical Power and Distribution Equipment
AREA CMAN	Configuration Management
AREA EMCS	Electromagnetic Compatibility Standards
AREA FACR	Facilities Engineering and Design Requirements
AREA GDRQ	General Design Requirements
AREA MISC	Miscellaneous
AREA RELI	Reliability

AREA SLHC	Standards for Long-Haul Communications
AREA TCSS	Telecommunications Systems Standards
AREA TCTS	Tactical Communications Systems Technical Standards

The federal supply classification of the standardization documents is included with the documents for ease of use with Volume III of the DoDISS and with updating notices which are listed in order by AREA and FSC.

1.11 PRESENTATION OF SUMMARIES

Each summary in the following sections contains the full title of the document, key word(s) on the subject matter of the document, the effective date of the document, its revision status, a list of documents superseded by the document, a statement regarding the applicability of the document, a statement of its purpose, and, if appropriate, comments concerning the document.

SECTION 2

BASIC EMC STANDARDIZATION DOCUMENTS

2.1 INTRODUCTION

The documents listed in this section are DoD directives/instructions, DoD/military standards, military specifications, and military handbooks. All of the documents in this section are basic EMC standardization documents issued by the Department of Defense and DoD components to ensure that EMC is adequately considered in procurement of electrical, electromechanical, electronic equipment, subsystems, and systems. These documents have been developed and are periodically updated by DoD to specifically address EMC in areas where experience, analysis, and testing have shown that problems may be encountered.

For DoD directives/instructions, the current status of the document and supersedence information is provided in this section to ensure that the most recent issue is followed. These documents reflect policy within DoD and are not referenced in contractual documents as are the standards, specifications, and handbooks.

For the standards, specifications, and handbooks included in this section, a comprehensive listing of dates of revisions, notices, or other changes is provided. This information is often required because these documents are referenced in and become part of contractual documents. For long-term procurement programs that may cover up to 30 years, several revisions/notices to the same document may be applicable, depending on when various phases of the program are implemented. In some circumstances, tailoring of the standards specifications/handbooks may be called out in the contract. In these instances, it may only be necessary to consult appropriate versions/sections of the referenced documents.

All of the standards/specifications/handbooks listed in Section 2 fall into an easily selected standardization area entitled Electromagnetic Compatibility Standards (EMCS) as referenced in the DoD Index of Specifications and Standards (DoDISS). This class/area is listed with the document

number in the information that is provided in the Section 2 listing. The area description that is provided for EMC standards taken from the DoD Standardization Directory (SD-1) follows.

The EMCS area covers requirements and procedures to achieve electromagnetic compatibility within all frequency ranges of platforms, facilities, electrical and electronic systems/equipment, circuits, and components. Included are standards for:

- Prediction, measurement, and validation of electromagnetic compatibility
- Techniques and procedures relating to grounding, bonding, and shielding
- Prevention and control of electromagnetic radiation to personnel and equipment (including hazardous material and substances)
- Prevention of deleterious electromagnetic effects resulting from nuclear detonations (e.g., EMI and EMP).

Other information in the section listing includes applicability, purpose of the documents, and comments.

Standardization documents listed in this section are those most commonly used within the EMC community. Table 2-1 provides a listing of DoD directives and instructions on EMC described in Section 2.2. Table 2-2 provides a listing of DoD and military standards on EMC described in Section 2.3. Table 2-3 provides a listing of military specifications on EMC described in Section 2.4. Table 2-4 provides a listing of military handbooks on EMC described in Section 2.5.

Table 2-1. Basic DoD Directives and Instructions on EMC

DoD Directive 3222.3	<i>Department of Defense Electromagnetic Compatibility Program (EMCP)</i>
DoD Directive 4650.1	<i>Management and Use of the Radio Frequency Spectrum</i>
DoD Instruction 5000.2	<i>Defense Acquisition Management Policies and Procedures Part 6, Section G, Electromagnetic Compatibility and Radio Frequency Management</i>
DoD Instruction 6055.11	<i>Protection of DoD Personnel from Exposure to Radio Frequency Radiation</i>

Table 2-2. Military and DoD Standards on EMC

DoD-STD-1463	<i>Munitions to Electromagnetic Fields, Requirements for Evaluation of (U)</i>
DoD-STD-2169A	<i>High Altitude Electromagnetic Pulse (HEMP) Environment (U)</i>
MIL-STD-220A	<i>Method of Insertion Loss Measurement</i>
MIL-STD-285	<i>Methods of Attenuation Measurements for Enclosures, Electromagnetic Shielding for Electronic Test Purposes</i>
MIL-STD-449D	<i>Measurement of Radio Frequency Spectrum Characteristics</i>
MIL-STD-461D	<i>Requirements for the Control of Electromagnetic Interference Emissions and Susceptibility</i>
MIL-STD-462D	<i>Measurement of Electromagnetic Interference Characteristics</i>
MIL-STD-463A	<i>Definitions and System of Units, Electromagnetic Interference Technology</i>
MIL-STD-469A	<i>Radar Engineering Design Requirements, Electromagnetic Compatibility</i>
MIL-STD-1310F	<i>Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility and Safety</i>
MIL-STD-1337B	<i>General Suppression System Design Requirements for Portable Electric Hand Tools (Use MIL-STD-461, MIL-STD-462)</i>
MIL-STD-1377	<i>Effectiveness of Cable, Connector, and Weapon Enclosure Shielding and Filters in Precluding Hazards of Electromagnetic Radiation to Ordnance, Measurement of Preclusion of Ordnance Hazards in Electromagnetic Fields, General Requirements for Electroexplosive Subsystems, Electrically Initiated, Design Requirements and Test Methods</i>
MIL-STD-1385B	<i>Electromagnetic Compatibility Requirements for Space Systems</i>
MIL-STD-1512	<i>Electromagnetic Compatibility and Grounding Requirements for Space System Facilities</i>
MIL-STD-1541A	<i>Procedures for Conducting a Shipboard Electromagnetic Interference (EMI) Survey (Surface Ships)</i>
MIL-STD-1542B	<i>Lightning Qualification Test Techniques for Aerospace Vehicles and Hardware</i>
MIL-STD-1605	<i>Lightning Protection of Aerospace Vehicles and Hardware</i>
MIL-STD-1757A	<i>Electromagnetic Effects Requirements for Systems</i>
MIL-STD-1795A	<i>Grounding, Bonding and Shielding Design Practices</i>
MIL-STD-1818A	
MIL-STD-1857	

Table 2-3. Military Specifications on EMC

MIL-B-5087B	<i>Bonding, Electrical, and Lightning, Protection for Aerospace Systems</i>
MIL-E-6051D	<i>Electromagnetic Compatibility Requirements, Systems</i>
MIL-A-17161D	<i>Absorber, Radio Frequency Radiation (Microwave Absorbing Material), General Specification for</i>

Table 2-4. Military Handbooks on EMC

MIL-HDBK-235-1A	<i>Electromagnetic (Radiated) Environment Considerations For Design and Procurement of Electrical and Electronic Equipment of Subsystems and Systems</i>
MIL-HDBK-237A	<i>Electromagnetic Compatibility Management Guide for Platforms, Systems, and Equipments</i>
MIL-HDBK-241B	<i>Design Guide for Electromagnetic Interference (EMI) Reduction in Power Supplies</i>
MIL-HDBK-253	<i>Guidance for the Design and Test of Systems Protected Against the Effects of Electromagnetic Energy</i>
MIL-HDBK-274	<i>Electrical Grounding for Aircraft Safety</i>
MIL-HDBK-293	<i>Electronic Counter-Countermeasures Considerations in Radar Systems Acquisition</i>
MIL-HDBK-294	<i>Electronic Counter-Countermeasures Considerations in Naval Communication Systems</i>
MIL-HDBK-335	<i>Management and Design Guidance Electromagnetic Radiation Hardness for Air Launched Ordnance Systems</i>
MIL-HDBK-419A	<i>Grounding, Bonding, and Shielding for Electronic Equipments and Facilities Volume 1 Basic Theory, Volume 2 Applications</i>

2.2 DoD DIRECTIVES AND INSTRUCTIONS ON EMC

Summaries of DoD directives and instructions on EMC are presented in this subsection.

Document #: DoD Directive 3222.3

Title: *Department of Defense Electromagnetic Compatibility Program (EMCP)*

Key Word(s): EMCP

Effective Date: 20 August 1990

Revision Level: NA

Supersedence: DoD Directive 3222.3, *Department of Defense Electromagnetic Compatibility Program*, 5 July 1967, which is cancelled.
DoD Directive 5160.57, *Electromagnetic Compatibility Analysis Center (ECAC)*, 23 September 1966, which is cancelled.

Applicability: This directive applies to the Office of the Secretary of Defense and all DoD components. The responsibilities of the Electromagnetic Compatibility Analysis Center (ECAC) with respect to the DoD EMCP are detailed in this directive.

Purpose: The purpose of this directive is to update DoD policy on an integrated EMCP to ensure EMC of all military electronic and telecommunications equipment subsystems and systems during their conceptual, design, acquisition, and operational phases.

Comments: None

Document #: DoD Directive 4650.1

Title: *Management and Use of the Radio Frequency Spectrum*

Key Word(s): Spectrum Management

Effective Date: 24 June 1987

Revision Level: NA

Supersedence: DoD Directive 4650.1, *Management and Use of the Radio Frequency Spectrum*, dated 13 December 1974, which is cancelled.

Applicability: This directive is mandatory for all military services and other DoD components.

Purpose: The purpose of this directive is to define DoD policy, assign responsibilities, and establish specific procedures for management and use of the RF spectrum by DoD components.

Comments: This directive mandates that all DoD components obtain frequency spectrum guidance for communications-electronic systems from the MCEB as early as possible during system acquisition, MCEB guidance must be obtained before DoD components assume contractual obligations for the full-scale development, production, or procurement of C-E systems, coordination with host nations where the equipment will be deployed must be initiated before contracting for full-scale development or production of the system.

Document #: DoD Instruction 5000.2

Title: *Defense Acquisition Management Policies and Procedures Part 6, Section G, Electromagnetic Compatibility and Radio Frequency Management*

Key Word(s): Acquisition

Effective Date: 23 February 1991

Supersedence: DoD Instruction 5000.2, *Defense Acquisition Program Procedures*, dated 1 September 1987, which is cancelled.

Applicability: This instruction applies to the Office of the Secretary of Defense, and all DoD components, and the management of defense acquisition programs and highly sensitive classified programs.

Purpose: The purpose of the policies and procedures in Part 6, Section G of this instruction is to establish the basis to ensure that Defense electric or electronic equipment can operate in its intended environments without causing or suffering undue interference to or from other electric or electronic equipment operating in those environments.

Comments: The support and use of the ECAC database and EMC analysis capabilities by DoD components are detailed in this instruction.

Document #: DoD Instruction 6055.11

Title: *Protection of DoD Personnel from Exposure to Radio Frequency Radiation*

Key Word(s): Radiation

Effective Date: 20 August 1986

Revision Level: NA

Supersedence: Supplements DoD Directive 1000.3, *Safety and Occupational Health Policy for the Department of Defense*, 29 March 1979. Supplements DoD Instruction 6055.8, *Occupational Radiation Protection Program*, 3 January 1983.

Applicability: This instruction applies to the Office of the Secretary of Defense and its field activities, the military departments (including the reserve components), the Organization of the Joint Chiefs of Staff (OJCS), the Unified and Specified Commands, and the Defense Agencies.

This instruction also applies to all DoD civilian and military personnel who may be exposed to radio frequency radiation (RFR) in excess of the permissible exposure limits stated in this document.

Purpose: The purpose of this instruction is to establish a uniform personnel policy for exposure to RF radiation resulting from DoD operations.

Comments: The instruction will require updating to comply with IEEE ANSI C95.1-1991, *IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz*.

2.3 MILITARY AND DOD STANDARDS ON EMC

Summaries of military and DoD standards on EMC are presented in this subsection.

Document #: DoD-STD-1463

Title: *Munitions to Electromagnetic Fields, Requirements for Evaluation of (U)*

Key Word(s): HERO, Munitions

Effective Date: 20 December 1979

Revision Level: Original 20 Dec 1979

Supersedence: NA

Applicability: This standard is approved for use by the Department of Army and is available for use by all DoD components.

Purpose: The purpose of this standard is to provide munitions designers with information on the electromagnetic field intensities to which munitions systems must be certified and the criteria for performing susceptibility evaluation tests.

Comments: DoD-STD-1463 was prepared by US Army Armament Research and Development Center, Picatinny Arsenal, NJ 07086-5000. The area/supply code for this document is FSC EMCS.

Document #: DoD-STD-2169A

Title: *High Altitude Electromagnetic Pulse (HEMP) Environment (U)*

Key Word(s): HEMP

Effective Date: 1 December 1987

Revision Level: Rev A 01 Dec 1987
Original 17 Jun 1985

Supersedence: NA

Applicability: This standard is approved for use by all DoD components.

Purpose: The purpose of this standard is to promulgate a DoD-approved description of a reasonable worst-case electromagnetic field that could be observed on the earth's surface due to the electromagnetic pulse (EMP) produced by a high-altitude nuclear detonation.

Comments: DoD-STD-2169 was prepared by the Defense Nuclear Agency, ATTN: RAEE Washington, DC 20305-1000. The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-220A

Title: *Method of Insertion Loss Measurement*

Key Word(s): Insertion Loss Measurement

Effective Date: 19 September 1988

Revision Level: Rev A Notice 2 19 Sep 1988
 Rev A Notice 1 08 Mar 1978
 Rev A 15 Dec 1959
 Original 25 Jun 1952

Supersedence: NA

Applicability: This standard is approved for use by all DoD components.

Purpose: The purpose of this standard is to explain a method of measuring the insertion loss of feed through suppression capacitors, and of single and multiple circuit RF filters at frequencies up to 1000 MHz. The basic standard is for 50-ohm systems. Notice 1 addresses the application of MIL-STD-220A non 50-ohm systems.

Comments: The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-285

Title: *Methods of Attenuation Measurements for Enclosures, Electromagnetic Shielding for Electronic Test Purposes*

Key Word(s): Shielding

Effective Date: 25 June 1956

Revision Level: Original 25 Jun 1956

Supersedence: This standard supersedes MIL-S-18123 (SHIPS), dated 1 August 1954, which is cancelled.

Applicability: This standard is mandatory for the Army, Navy, and Air Force.

Purpose: The purpose of this standard is to explain a method of measuring the attenuation characteristics of electromagnetic shielding enclosures used for electronic test purposes over the frequency range from 100 kHz to 1000 MHz.

Comments: The current plan is for DoD to adopt IEEE Std 299-1991 (Revision of IEEE Std 299-1969), *IEEE Standard for Measuring the Effectiveness of Electromagnetic Shielding Enclosures*, to replace MIL-STD-285. The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-449D

Title: *Measurement of Radio Frequency Spectrum Characteristics*

Key Word(s): RF Measurement

Effective Date: 18 May 1976

Revision Level:

Rev D Notice 1	18 May 1976
Rev D	22 Feb 1973
Rev C	01 Mar 1965
Rev B	29 Jul 1963
Rev A	24 Oct 1961
Original	20 May 1960

Supersedence: This standard supersedes MIL-STD-752 (SHIPS), dated 1 September 1961.

Applicability: This standard is approved for use by all DoD components.

Purpose: The purpose of this standard is to establish uniform measurement techniques to determine EMC characteristics of transmitters, receivers, antenna systems, and couplers. This applies to all equipments, subsystems, and systems that are designed to emit or respond to EM energy from 0.14 MHz to 12 GHz.

Comments: A set of measurement procedures for determining EMC characteristics of multichannel wideband communications systems was developed during 1981 and 1982. These procedures were developed in a joint effort between ECAC and USAEPG and were documented in a format suitable for inclusion in MIL-STD-449. The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-461D

Title: *Requirements for the Control of Electromagnetic Interference Emissions and Susceptibility*

Key Word(s): EMI

Effective Date: 11 January 1993

Revision Level:

Rev D	11 Jan 1993
Rev C	04 Aug 1986
Rev B	01 Apr 1980
Rev A	01 Aug 1968
Original	31 Jul 1967

Supersedence: Superseded documents include MIL-I-6181, MIL-S-10379, MIL-S-12348, MIL-I-43121, MIL-E-55301(E), MIL-I-16910, MIL-I-17623, NFEC SPEC-50Y, MIL-STD-826A, and MIL-I-26600.

Applicability: This standard is approved for use by all DoD for procurement.

Purpose: The purpose of this standard is to ensure that interference control is considered in the design of systems. It provides a basis for evaluating the EMC characteristics of equipments and systems, as well as for inputs to analysis of the EMC and effectiveness of systems in a complex EME.

Comments: The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-462D

Title: *Measurement of Electromagnetic Interference Characteristics*

Key Word(s): EMI Measurement

Effective Date: 11 January 1993

Revision Level:

Rev D	11 Jan 1993
Notice 6	15 Oct 1987
Notice 5 Interim	04 Aug 1986
Notice 4 Navy	01 Apr 1980
Notice 3 Army	09 Feb 1971
Notice 2	01 May 1970
Notice 1	01 Aug 1968
Original	31 Jul 1967

Supersedence: NA

Applicability: This standard is approved for use by all DoD components.

Purpose: The purpose of this standard is to establish techniques to be used for the measurement and determination of the EMC characteristics (emission and susceptibility) of electrical electronic and electromechanical equipment, as required by MIL-STD-461D.

Comments: This standard is designated as revision D to coincide with its companion document MIL-STD-461D. Revisions A, B, and C of MIL-STD-462 were never issued. The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-463A

Title: *Definitions and System of Units, Electromagnetic Interference Technology*

Key Word(s): EMI

Effective Date: 19 September 1988

Revision Level:

Rev A, Notice 1	19 Sep 1988
Rev A	01 Jun 1977
Notice 1	02 Mar 1972
Original	09 Jun 1966

Supersedence: NA

Applicability: This standard is mandatory for all DoD components.

Purpose: The purpose of this standard is to provide general EMC definitions, abbreviations, and acronyms used in MIL-STD-461() and MIL-STD-462(). They are limited to statements of meaning as related to these and referenced standards. Whenever possible, definitions also conform to those of ANSI, IEEE, SAE, NATO, etc.

Comments: This standard was Reaffirmed by Rev A, Notice 1. An update of MIL-STD-463A has been prepared as ANSI C63.14, *American National Standard Dictionary for Technologies of Electromagnetic Compatibility (EMC), Electromagnetic Pulse (EMP), Electrostatic Discharge (ESD)*. This standard was published by the IEEE Standards Group in 1992. The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-469A

Title: *Radar Engineering Design Requirements, Electromagnetic Compatibility*

Key Word(s): Radar EMC

Effective Date: 2 December 1991

Revision Level: Rev A 02 Dec 1991
Notice 1 30 Mar 1967
Original 01 Dec 1966

Supersedence: NA

Applicability: The applicable portions of this standard are mandatory for use by all DoD components unless waived by the cognizant project office with recommendation from the appropriate EMC group.

Purpose: The purpose of this standard is to establish the engineering design requirements to control the electromagnetic emission and susceptibility characteristics of all new military radar equipment and systems operating between 100 MHz and 100 GHz. The standard also is designed to promote EMC and conserve the frequency spectrum available to military radar systems.

Comments: The minimum design requirements given in this standard satisfy the Radar Spectrum Engineering Criteria (RSEC); Section 5.3 in the National Telecommunications and Information Administration (NTIA) *Manual of Regulations and Procedures for Federal Radio Frequency Management*. The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-1310F

Title: *Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility and Safety*

Key Word(s): Grounding

Effective Date: 30 December 1992

Revision Level: Rev F 30 Dec 1992
Rev E 18 Aug 1987
Rev D 08 Feb 1979
Rev C 30 Nov 1973
Rev B 15 Apr 1971
Rev A 27 Dec 1967
Original 21 Apr 1967

Supersedence: NA

Applicability: This standard is approved for use by the Department of the Navy and is available for use by all DoD components.

Purpose: The purpose of this standard is to provide methods for shipboard bonding, grounding, shielding, and the use of nonmetallic materials for EMI reduction, intermodulation interference (IMI) reduction, protection of personnel from electrical shock, and protection of electronic equipment from an electromagnetic pulse (EMP). In addition, methods for the installation of shipboard ground systems are also provided. The area/supply code for this document is FSC EMCS.

Comments: None

Document #: MIL-STD-1337B

Title: *General Suppression System Design Requirements for Portable Electric Hand Tools (Use MIL-STD-461, MIL-STD-462)*

Key Word(s): Suppression System Design

Effective Date: 18 April 1971

Revision Level:	Rev B Notice 1	18 Oct 1989
	Rev B	08 Apr 1971
	Rev A	16 Jun 1969
	Original	12 Feb 1969

Supersedence: This standard has been superseded by MIL-STD-461 and MIL-STD-462.

Applicability: This standard is mandatory for Naval Ship Systems Command.

Purpose: The purpose of this standard is to explain EMI design requirements for portable electric hand tools.

Comments: This standard was cancelled by Revision B, Notice 1 on 18 October 1989. The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-1377

Title: *Effectiveness of Cable, Connector, and Weapon Enclosure Shielding and Filters in Precluding Hazards of Electromagnetic Radiation to Ordnance, Measurement of*

Key Word(s): HERO

Effective Date: 20 August 1971

Revision Level:	Original	20 Aug 1971
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Supersedence: NA

Applicability: This standard is mandatory for the Department of the Navy.

Purpose: The purpose of this standard is to provide shielding and filter-effectiveness test methods to determine if particular weapon-system design requirements have been properly implemented.

Comments: The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-1385B

Title: *Preclusion of Ordnance Hazards in Electromagnetic Fields, General Requirements for*

Key Word(s): HERO

Effective Date: 1 August 1986

Revision Level: Rev B 01 Aug 1986
Rev A 06 Dec 1982
Original 06 Apr 1972

Supersedence: MIL-STD-1385 replaced MIL-P-24014 (WEP), which was cancelled 10 November 1972.

Applicability: This standard applies to all naval weapon systems, safety and emergency devices, and other ancillary equipment containing electrically initiated explosive, propellant, or pyrotechnic components.

Purpose: The purpose of this standard is to establish general requirements for controlling hazards to ordnance utilizing electroexplosive devices when exposed to electromagnetic fields. The nominal frequency range covered by the standard is from 10 kHz to 40 GHz.

Comments: The standard is related to NAVSEA OD 30393, *Design Principle and Practices for Controlling Hazards of Electromagnetic Radiation to Ordnance* (HERO Design Guide). The standard is related to MIL-STD-1512, *Electroexplosive Subsystems, Electrically Initiated, Design Requirements and Test Methods*. The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-1512

Title: *Electroexplosive Subsystems, Electrically Initiated, Design Requirements and Test Methods*

Key Word(s): HERO

Effective Date: 6 January 1976

Revision Level: Notice 1 06 Jan 1976
Original 21 Mar 1972

Supersedence: NA

Applicability: This standard is mandatory for the Department of the Air Force.

Purpose: The purpose of this standard is to establish the general requirements and test methods for the design and development of electroexplosive subsystems and associated items to preclude hazards from unintentional detonation. These requirements apply to all subsystems using electrically initiated, explosive, or pyrotechnic components.

Comments: The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-1541A

Title: *Electromagnetic Compatibility Requirements for Space Systems*

Key Word(s): Space Systems

Effective Date: 30 December 1987

Revision Level: Rev A 30 Dec 1987
Original 15 Oct 1973

Supersedence: NA

Applicability: This standard is approved for use within the Department of the Air Force and is available for use by all DoD components.

Purpose: The purpose of this standard is to establish EMC requirements for space systems, including launch vehicles, space vehicles, ground systems, and associated aerospace ground equipment (AGE). It does not apply to facilities that house such items.

Comments: The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-1542B

Title: *Electromagnetic Compatibility and Grounding Requirements for Space System Facilities*

Key Word(s): Space System Facilities, Grounding

Effective Date: 15 November 1991

Revision Level: Rev B 15 Nov 1991
Rev A 01 Mar 1988
Original 15 Apr 1974

Supersedence: NA

Applicability: This standard is approved for Air Force (see Comments).

Purpose: The purpose of this standard is to specify the design performance and verification requirements for electrical subsystems for space system facilities including electromagnetic compatibility (EMC), electrical power, grounding, bonding, shielding, lightning protection, and TEMPEST security. These requirements are interrelated and interdependent, and therefore require an integrated approach in the design.

Comments: This standard is intended primarily for use in design and construction contracts for space system facilities. It applies to all related facilities including, but not limited to, launch complexes, tracking stations data processing rooms, satellite control centers, check out stations, space craft or booster assembly buildings, and any associated station or mobile structures that house electrical and electronic equipment. The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-1605

Title: *Procedures for Conducting a Shipboard Electromagnetic Interference (EMI) Survey (Surface Ships)*

Key Word(s): Shipboard EMI

Effective Date: 20 April 1973

Revision Level: Original 20 Apr 1973

Supersedence: NA

Applicability: This standard is approved for the Naval Ship Systems Command.

Purpose: The purpose of this standard is to provide detailed procedures for conducting an EMI survey aboard surface ships. An EMI survey is required for new-construction ships and ships receiving overhauls or other major repair work that changes the electromagnetic configuration.

Comments: A revision of this standard is scheduled in 1994. The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-1757A

Title: *Lightning Qualification Test Techniques for Aerospace Vehicles and Hardware*

Key Word(s): Lightning Qualification Test

Effective Date: 31 Jan 1993

Revision Level: Rev A Notice 2 31 Jan 1993
Rev A Notice 1 15 Apr 1991
Rev A 20 Jul 1983
Original 7 Jun 1980

Supersedence: NA

Applicability: This standard is approved for use by all DoD components.

Purpose: The purpose of this standard is to present standard test waveforms and techniques for lightning qualification testing of aerospace vehicles and hardware. Tests include high-voltage and high-current physical-damage tests. Indirect effects on electronic equipment will be added later.

Comments: The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-1795A

Title: *Lightning Protection of Aerospace Vehicles and Hardware*

Key Word(s): Lightning Protection

Effective Date: 1 August 1989

Revision Level: Rev A Notice 1 01 Aug 1989
 Rev A 20 Jun 1989
 Original 30 May 1986

Supersedence: NA

Applicability: This standard is mandatory for use within the Department of the Air Force and is available for use by all DoD components.

Purpose: The purpose of the standard is to establish requirements and verification criteria for lightning protection of aerospace vehicles and hardware. This standard applies to aerospace vehicles and hardware including all associated subsystems, equipments, components and stores.

Comments: Distribution of this document is controlled. Requests from groups other than DoD must be sent to ASD/ENES, Wright-Patterson AFB, OH. The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-1818A

Title: *Electromagnetic Effects Requirements for Systems*

Key Word(s): Electromagnetic Effects

Effective Date: 4 October 1993

Revision Level: Rev A 04 Oct 1993
 Notice 2 25 Nov 1992
 Notice 1 12 Aug 1992
 Original 08 May 1992

Supersedence: For the Air Force only, MIL-STD-1818A supersedes MIL-E-6051 and MIL-B-5087B.

Applicability: This standard is applicable for complete systems, both new and modified, and is mandatory for use by the Department of the Air Force. The document is available for use by all DoD components.

Purpose: The purpose of this standard is to establish requirements, verification criteria, and contractor tasks for electromagnetic environmental effects protection of airborne systems and associated support systems.

Comments: The area/supply code for this document is FSC EMCS.

Document #: MIL-STD-1857

Title: *Grounding, Bonding and Shielding Design Practices*

Key Word(s): Grounding, Bonding, and Shielding

Effective Date: 19 September 1988

Revision Level: Notice 1 19 Sep 1988
Original 30 Jun 1976

Supersedence: NA

Applicability: This standard is approved for use by Electronics Command, Department of the Army and is available for use by all DoD components.

Purpose: The purpose of this standard is to explain the characteristics of grounding, bonding, and shielding design practices to be applied in the construction and installation of marine fixed stations, and transportable and ground mobile equipment, subsystems, and systems.

Comment: The area/supply code for this document is FSC EMCS.

2.4 MILITARY SPECIFICATIONS ON EMC

Summaries of military specifications on EMC are presented in this subsection.

Document #:	MIL-B-5087B												
Title:	<i>Bonding, Electrical, and Lightning, Protection for Aerospace Systems</i>												
Key Word(s):	Lightning Protection												
Effective Date:	24 December 1984												
Revision Level:	<table> <tr> <td>Rev B Int Amend 3</td><td>24 Dec 1984</td></tr> <tr> <td>Rev B Amend 2</td><td>31 Aug 1970</td></tr> <tr> <td>Rev B Amend 1</td><td>06 Feb 1968</td></tr> <tr> <td>Rev B</td><td>15 Oct 1964</td></tr> <tr> <td>Rev A</td><td>30 Jul 1954</td></tr> <tr> <td>Original</td><td>09 Nov 1949</td></tr> </table>	Rev B Int Amend 3	24 Dec 1984	Rev B Amend 2	31 Aug 1970	Rev B Amend 1	06 Feb 1968	Rev B	15 Oct 1964	Rev A	30 Jul 1954	Original	09 Nov 1949
Rev B Int Amend 3	24 Dec 1984												
Rev B Amend 2	31 Aug 1970												
Rev B Amend 1	06 Feb 1968												
Rev B	15 Oct 1964												
Rev A	30 Jul 1954												
Original	09 Nov 1949												
Supersedence:	This specification has been superseded in the Air Force by MIL-STD-1818A.												
Applicability:	This specification was approved by the Department of the Air Force and the Naval Air Systems Command.												
Purpose:	The purpose of this specification is to explain characteristics, application, and testing of electrical bonding for aerospace systems, as well as bonding for the installation and interconnection of electrical and electronic equipment therein and lightning protection.												
Comments:	The area/supply code for this document is FSC 6150, EMCS.												

Document #:	MIL-E-6051D														
Title:	<i>Electromagnetic Compatibility Requirements, Systems</i>														
Key Word(s):	EMC														
Effective Date:	26 February 1988														
Revision Level:	<table> <tr> <td>Rev D Notice 1</td><td>26 Feb 1988</td></tr> <tr> <td>Rev D Amend 1</td><td>05 Jul 1968</td></tr> <tr> <td>Rev D</td><td>07 Sep 1967</td></tr> <tr> <td>Rev C</td><td>17 Jun 1960</td></tr> <tr> <td>Rev B</td><td>23 Jan 1959</td></tr> <tr> <td>Rev A</td><td>23 Jan 1953</td></tr> <tr> <td>Original</td><td>28 Mar 1950</td></tr> </table>	Rev D Notice 1	26 Feb 1988	Rev D Amend 1	05 Jul 1968	Rev D	07 Sep 1967	Rev C	17 Jun 1960	Rev B	23 Jan 1959	Rev A	23 Jan 1953	Original	28 Mar 1950
Rev D Notice 1	26 Feb 1988														
Rev D Amend 1	05 Jul 1968														
Rev D	07 Sep 1967														
Rev C	17 Jun 1960														
Rev B	23 Jan 1959														
Rev A	23 Jan 1953														
Original	28 Mar 1950														
Supersedence:	This standard is superseded in the Air Force by MIL-STD-1818A.														
Applicability:	This specification is mandatory for use by all DoD components.														
Purpose:	The purpose of this specification is to outline the overall requirements for systems EMC, including control of the system electromagnetic environment, lightning protection, static electricity, bonding, and grounding. It is applicable to complete systems, including all associated subsystems/equipments.														
Comments:	MIL-E-6051D is related to SAE ARP 4242. This is an industry standard in final draft form. The area/supply code for this document is AREA EMCS.														

Document #: MIL-A-17161D

Title: *Absorber, Radio Frequency Radiation (Microwave Absorbing Material), General Specification for*

Key Word(s): Absorbing Material

Effective Date: 24 June 1985

Revision Level: Rev D 24 Jun 1985
Rev C 18 Nov 1959
Rev B
Rev A

Supersedence: NA

Applicability: This specification is approved for use by the Department of the Navy and is available for use by all DoD components.

Purpose: The purpose of this specification is to explain the requirements for RF radiation absorbing material (RAM).

Comment: These materials are generally elastomers such as isoprene, neoprene, silicone, or urethane. The materials have been manufactured so that they appear electrically one-fourth of a wavelength deep, so that a beam reflecting from a conductive backing emerges inverted and cancels the incident beam. The area/supply code for this document is AREA EMCS.

2.5 MILITARY HANDBOOKS ON EMC

Summaries of military handbooks on EMC are presented in this subsection.

Document #: MIL-HDBK-235-1B

Title: *Electromagnetic (Radiated) Environment Considerations For Design and Procurement of Electrical and Electronic Equipment of Subsystems and Systems*

Key Word(s): EMC Design

Effective Date: 1 May 1993

Revision Level: Rev B 01 May 1993
Rev A Notice 1 18 Dec 1986
Rev A 05 Feb 1979
Original 23 Jun 1972

Supersedence: NA

Applicability: This handbook is approved for use by all DoD components.

Purpose: The purpose of this handbook is to provide information for tailoring the EME for consideration in the design and procurement of new systems that may be exposed to electromagnetic radiation levels. The handbook contains descriptions of land, sea, and air electromagnetic environments.

Part 1B	Index and Summary	(UNCLASSIFIED)	01 May 1993
Part 2B	Own Force Emitters	(SECRET)	01 May 1993
Part 3B	Hostile Emitters	(SECRET)	01 May 1993
Part 4	Army Installations	(CONFIDENTIAL)	05 Feb 1979
Part 5	Battle Force Scenarios	(SECRET)	01 May 1993

Comments: ECAC has assisted in preparation of an update of Parts I, II, and III, and has developed Section V (a new part) of this handbook. The area/supply code for this document is AREA EMCS.

Document #: MIL-HDBK-237A

Title: *Electromagnetic Compatibility Management Guide for Platforms, Systems, and Equipments*

Key Word(s): EMC

Effective Date: 14 February 1992

Revision Level: Rev A Notice 2 14 Feb 1992
Rev A Notice 1 16 Jun 1986
Original 20 Apr 1973

Supersedence: NA

Applicability: Provisions of this handbook are to be applied by procuring agencies and by development and operations activities of DoD at appropriate times during the life cycle of any platform, system, or equipment that emits or that can be susceptible to electromagnetic energy.

Purpose: The purpose of this handbook is to provide managers responsible for the design and acquisition of DoD systems with the guidance necessary to establish an effective program for achieving EMC.

Comments: The handbook describes the steps to ensure EMC considerations are incorporated into platform, system, or equipment design. The area/supply code for this document is AREA EMCS.

Document #: MIL-HDBK-241B

Title: *Design Guide for Electromagnetic Interference (EMI) Reduction in Power Supplies*

Key Word(s): EMI, Power Supplies

Effective Date: 29 November 1984

Revision Level:	Rev B Notice 1	29 Nov 1984
	Rev B	30 Sep 1983
	Rev A	01 Apr 1981
	Original	02 Aug 1974

Supersedence: NA

Applicability: This handbook is approved for all DoD use.

Purpose: The purpose of this handbook is to offer guidance to power supply designers in techniques to reduce conducted and radiated interference generated by power supplies.

Comments: The inherent advantage of switching mode technology for power supplies has spurred advances in component design (to limit the noise sources) and design techniques (to curtail noise coupling to the outside world). This handbook provides criteria for proper filter design in addition to providing pertinent EMI reduction techniques. The area/supply code for this document is AREA EMCS.

Document #: MIL-HDBK-253

Title: *Guidance for the Design and Test of Systems Protected Against the Effects of Electromagnetic Energy*

Key Word(s): EMC Design

Effective Date: 28 July 1978

Revision Level:	Original	28 Jul 1978
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Supersedence: NA

Applicability: This handbook is approved for all DoD use. It is applicable to any electronic system or equipment that may be exposed to electromagnetic energy.

Purpose: The purpose of the handbook is to provide program managers with guidance for the design and testing of electronic systems that are to be immune to the detrimental effects of electromagnetic energy.

Comments: The area/supply code for this document is AREA EMCS.

Document #: MIL-HDBK-274

Title: *Electrical Grounding for Aircraft Safety*

Key Word(s): Grounding

Effective Date: 29 June 1990

Revision Level: Notice 1 29 Jun 1990
Original 01 Nov 1983

Supersedence: NA

Applicability: This handbook was developed for use by the Naval Air Systems Command and is available for all DoD use. This handbook is reviewed periodically to ensure its completeness and currency.

Purpose: The purpose of this handbook is to provide a single, standard reference source to be used by naval aircraft operational and maintenance personnel (including public works department personnel) to ensure that the aircraft under their jurisdiction are properly and safely electrically grounded and bonded.

Comments: The area/supply code for this document is AREA EMCS.

Document #: MIL-HDBK-293

Title: *Electronic Counter-Countermeasures Considerations in Radar Systems Acquisition*

Key Word(s): Radar ECCM, Acquisition

Effective Date: 5 June 1987

Revision Level: Original 05 Jun 1987

Supersedence: NA

Applicability: This handbook was developed by the Department of the Navy. Provisions of this handbook are to be applied during the acquisition process. The handbook may also be applied by contractors as a guide for establishing and implementing an ECCM program during the contract phase.

Purpose: The purpose of this handbook is to provide guidelines for incorporating electronic counter-countermeasures (ECCM) into US Navy radar systems during the systems acquisition process. While the handbook is specifically addressed to the project or acquisition director, it should be useful to other participants in the acquisition process.

Comments: The area/supply code for this document is AREA EMCS.

Document #: MIL-HDBK-294

Title: *Electronic Counter-Countermeasures Considerations in Naval Communication Systems*

Key Word(s): ECCM

Effective Date: 31 December 1986

Revision Level: Original 31 Dec 1986

Supersedence: NA

Applicability: This handbook was developed by the Department of the Navy. Provisions of this handbook are to be applied during the acquisition process. The handbook may also be applied by contractors as a guide for establishing and implementing an ECCM program during the contract phase.

Purpose: The purpose of this handbook is to provide guidelines for incorporating electronic counter-countermeasures (ECCM) into US Naval Communications systems during the system acquisition process. While the handbook is specifically addressed to the project or acquisition director, it should be useful to other participants in the acquisition process.

Comments: The area/supply code for this document is AREA EMCS.

Document #: MIL-HDBK-335

Title: *Management and Design Guidance Electromagnetic Radiation Hardness for Air Launched Ordnance Systems*

Key Word(s): HERO

Effective Date: 28 December 1992

Revision Level: Notice 2 28 Dec 1992
Notice 1 26 Mar 1987
Original 15 Jan 1981

Supersedence: NA

Applicability: This handbook was developed by the Air Force and is available for all DoD use.

Purpose: The purpose of this handbook is to provide program managers and system designers with guidance for the design, development, and acquisition of air launched ordnance systems that are hardened against the detrimental effects of electromagnetic radiation (EMR).

Comments: This handbook is being revised by Rome Laboratories. The area/supply code for this document is FSC EMCS.

Document #: MIL-HDBK-419A

Title: *Grounding, Bonding, and Shielding for Electronic Equipments and Facilities*
Volume 1 Basic Theory, Volume 2 Applications

Key Word(s): Grounding, Bonding, and Shielding

Effective Date: 29 December 1987

Revision Level: Rev A 29 Dec 1987
Original 21 Jan 1982

Supersedence: NA

Applicability: This handbook was developed and updated by the Air Force Communication Command (AFCC) and implements the requirements of MIL-STD-188-124A, *Grounding Bonding and Shielding for Common Long Haul/Tactical Communications Systems*, which is mandatory for use within DoD.

Purpose: The purpose of this handbook is to address practical considerations for engineering of grounding systems, subsystems and other components of ground networks.

Comments: The information provided in this handbook primarily concerns grounding, bonding, and shielding of fixed plant telecommunications-electronics facilities; however, it also provides basic guidance in the grounding of deployed transportable communications-electronics equipment. The area/supply code for this document is AREA EMCS, SLHC, TCTS.

SECTION 3

DoD EMC-RELATED STANDARDIZATION DOCUMENTS

3.1 INTRODUCTION

The documents in this section are DoD directives, instructions and manuals, military standards and military handbooks that are EMC-related. These documents provide policy and procedures for acquisition, design, management and operation of electrical, electromechanical, electronic equipment systems and subsystems under procurement and/or deployment by DoD. Appropriate documents from this group are used by EMC analysts to determine the EMC requirements of their particular tasks.

For DoD directives, instructions and manuals, the status of the document and supersedence information is provided to ensure that the most recent issue is followed. These documents detail policy within DoD and are not referenced in contractual documents as are standards and handbooks.

For the standards and handbooks included in this section, a listing of dates of revisions, notices or other changes is provided. This information is often required because these documents are referenced and become part of contractual documents. For long-term procurement programs, several revisions/notices to the same document may be applicable depending on when various phases of the program are implemented.

DoD directives on EMC are listed in Table 3-1 and described in Section 3.2. DoD military standards on EMC are listed in Table 3-2 and described in Section 3.3. DoD military handbooks on EMC are listed in Table 3-3 and described in Section 3.4.

Table 3-1. EMC-Related DoD Directives, Instructions and Manuals

DoD Directive 3222.5	<i>Electromagnetic Compatibility (EMC) Management Program for SIGINT Sites (U)</i>
DoD Directive 4630.5	<i>Compatibility and Interoperability of Tactical Command, Control, Communications and Intelligence Systems</i>
DoD Directive 5000.1	<i>Defense Acquisition</i>
DoD Instruction 5000.2	<i>Defense Acquisition Management Policies and Procedures</i>
DoD 5000.2M	<i>Defense Acquisition Management Documentation and Reports</i>
DoD Directive 5100.35	<i>Military Communications-Electronics Board (MCEB)</i>

Table 3-2. EMC-Related Military Standards

MIL-STD-454N	<i>Electronic Equipment, Standard General Requirements For</i>
MIL-STD-499A	<i>Engineering Management</i>
MIL-STD-704E	<i>Aircraft Electric Power Characteristics</i>
MIL-STD-781D	<i>Reliability Testing for Engineering Development, Qualification and Production</i>
MIL-STD-889B	<i>Dissimilar Metals</i>
MIL-STD-973	<i>Configuration Management</i>
MIL-STD-1399C	<i>Interface Standard for Shipboard Systems</i>
MIL-STD-1399, Section 070, Part 1	<i>Interface Standard for Shipboard Systems, Section 070, Part 1, DC Magnetic Field Environment (Metric)</i>
MIL-STD-1399, Section 300A	<i>Interface Standard for Shipboard Systems Electric Power, Alternating Current</i>
MIL-STD-1399, Section 390	<i>Interface Standard for Shipboard Systems, Electric Power, Direct Current (Other Than Ships Battery) For Submarines (Metric)</i>
MIL-STD-1399, Section 406A	<i>Interface Standard for Shipboard Systems, Digital Computer Grounding</i>
MIL-STD-1399A, Section 408	<i>Interface Standard for Shipboard Systems, Section 408, Electromagnetic Radiation Hazards to Personnel and Fuels</i>
MIL-STD-1686A	<i>Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices) (Metric)</i>
MIL-STD-1695	<i>Environments, Working Minimum Standards for</i>

Table 3-3. EMC-Related Military Handbooks

MIL-HDBK-245C	<i>Preparation of Statement of Work (SOW)</i>
MIL-HDBK-248B	<i>Acquisition Streamlining</i>
MIL-HDBK-263A	<i>Electrostatic Discharge Control Handbook for Protection of Electrical, and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices) (Metric)</i>
MIL-HDBK-1012/1	<i>Electronic Facilities Engineering</i>

3.2 DoD EMC-RELATED DIRECTIVES, INSTRUCTIONS AND MANUALS

Summaries of EMC-related DoD directives, instructions, and manuals are presented in this subsection.

Document #: DoD Directive 3222.5

Title: *Electromagnetic Compatibility (EMC) Management Program for SIGINT Sites (U)*

Key Word(s): SIGINT Sites

Effective Date: 22 April 1987

Revision Level: NA

Supersedence: This directive is in accordance with DoD Directive 3222.3, *Department of Defense Electromagnetic Compatibility Program*, 5 July 1967.

Applicability: This directive applies to the Office of the Secretary of Defense and all DoD components.

Purpose: The purpose of this directive is to outline the responsibilities of the various agencies and the procedures to follow in achieving EMC for SIGINT sites. Technical guidelines are also provided.

Comments: A major concern for SIGINT sites is to provide interference-free zones and minimum elevation angle clearances.

Document #: DoD Directive 4630.5

Title: *Compatibility and Interoperability of Tactical Command, Control, Communications and Intelligence Systems*

Key Word(s): Tactical Command, Control, Communications and Intelligence Systems

Effective Date: 9 October 1985

Revision Level: NA

Supersedence: This directive supersedes DoD Directive 4630.5, *Compatibility and Commonality of Equipment for Tactical Command, Control, and Communications*, dated 28 January 1967.

Applicability: The provisions of this directive apply to the Office of the Secretary of Defense and all DoD components.

Purpose: The purpose of this directive is to establish DoD policy for compatibility and interoperability of tactical command, control, communications, and intelligence (C³I) systems, and to assign responsibility for its implementation.

Comments: None

Document #: DoD Directive 5000.1

Title: *Defense Acquisition*

Key Word(s): Acquisition

Effective Date: 23 February 1991

Revision Level: NA

Supersedence: This directive cancels and replaces DoD Directive 5000.1, *Major and Non-Major Defense Acquisition Programs*, dated 1 September 1987, and DoD Directive 4245.1, *Military Department Acquisition Management Officials*, dated 8 July 1986.

Part 5 of this directive cancels 63 DoD documents including memoranda, directives, instructions, manuals, and guidance documents relating to defense acquisition. The material in these documents cancelled by DoD 5000.1 has been updated and is included in DoD Instruction 5000.2, *Defense Acquisition Management Policies and Procedures*, dated 23 February 1991, and DoD 5000.2M, *Defense Acquisition Management Documentation and Reports*, also dated 23 February 1991.

Applicability: This directive applies to the Office of the Secretary of Defense and all DoD components.

Purpose: The purpose of this directive is to establish a disciplined DoD management approach for acquiring systems and materials.

Comments: None

Document #: DoD Instruction 5000.2

Title: *Defense Acquisition Management Policies and Procedures*

Key Word(s): Acquisition

Effective Date: 23 February 1991

Revision Level: NA

Supersedence: This instruction cancels and replaces DoD Instruction 5000.2, *Defense Acquisition Program Procedures*, 1 September 1987.

Applicability: This instruction applies to the Office of the Secretary of Defense and all DoD components, the management of defense acquisition programs and highly sensitive classified programs.

Purpose: The purpose of this instruction is to establish a core of fundamental policies and procedures that can be implemented down to the program manager and field operating command level without supplementation.

Comments: The subject matter information in this instruction was consolidated/updated from over 45 separate DoD issuances and other DoD component publications. A consolidated list of acquisition related documents that have been cancelled/replaced is provided in DoD Directive 5000.1, *Defense Acquisition*, 23 February 1991. Part 6, Section G, *Electromagnetic Compatibility and Radio Frequency Management*, of this instruction discusses ECAC database and analysis capabilities.

Document #: DoD 5000.2M

Title: *Defense Acquisition Management Documentation and Reports*

Key Word(s): Acquisition

Effective Date: 23 February 1991

Revision Level: NA

Supersedence: This manual is issued under authority of DoD Instruction 5000.2, *Defense Acquisition Management Policies and Procedures*, dated 23 February 1991.

Applicability: This manual applies to the Office of the Secretary of Defense and all DoD components.

Purpose: The purpose of this manual is to present procedures and formats for the preparation of various milestone documentation, periodic in-phase status reports, and statutory certifications.

Comments: Procedures and formats that relate to EMC requirements for test and evaluation master plans (TEMPs), and for waivers are included in this manual.

Document #: DoD Directive 5100.35

Title: *Military Communications-Electronics Board (MCEB)*

Key Word(s): MCEB

Effective Date: 4 September 1986

Revision Level: Notice 1 04 Sep 1986
Original 06 May 1985

Supersedence: This directive supersedes DoD Directive 5100.35, *Military Communications-Electronics Board (MCEB)*, dated 29 December 1962.

Applicability: This directive applies to the Office of the Secretary of Defense and all DoD components.

Purpose: The purpose of this directive is to define the duties of the MCEB.

Comments: The MCEB shall consider those military communications-electronics matters referred to it by the Secretary of Defense, the Joint Chiefs of Staff, and other authorities designated in the directive. The board shall:

- Perform coordination among DoD components, between DoD and other governmental departments and agencies, and between DoD and representatives of foreign nations
- Provide guidance and direction to DoD components
- Furnish advice and assistance, as requested.

A major function of the MCEB is to address frequency requirements for US interservice operations, and operations with NATO forces. The MCEB also deals with other areas related to EMC and the standardization of communications-electronics usage, worldwide.



3.3 EMC-RELATED MILITARY STANDARDS

Summaries of EMC-related military standards are presented in this subsection.

Document #: MIL-STD-454N

Title: *Electronic Equipment, Standard General Requirements For*

Key Word(s): Electronic Equipment

Effective Date: 30 June 1993

Revision Level:

Rev N Notice 1	30 Jun 1993
Rev N	30 Jun 1992
Rev M Notice 3	30 Oct 1991
Rev M Notice 2	03 Jun 1991
Rev M Notice 1	15 Aug 1990
Rev M	15 Dec 1989

Supersedence: NA

Applicability: This standard is approved for use by all DoD components.

Purpose: The purpose of this standard is to provide the technical baseline for the design and construction of electronic equipment for DoD.

Comments: Section 6.1 of this standard establishes criteria for controlling electromagnetic interference. Applicable EMC documents are also cited in this section. The standard captures in one document, under suitable subject headings, fundamental design requirements for eleven general electronic specifications. The area/supply code for this document is AREA GDRQ.

Document #: MIL-STD-499A

Title: *Engineering Management*

Key Word(s): Engineering Management

Effective Date: 17 July 1974

Revision Level:

Rev A	01 May 1974
Original Notice 1	07 Jan 1970
Original	17 Jul 1969

Supersedence: NA

Applicability: This standard is approved for use by the Department of the Air Force.

Purpose: The purpose of this standard is to provide the program manager:

- Criteria for evaluating engineering planning and output
- A means for establishing an engineering effort and a System Engineering Management Plan (SEMP)
- Task statements that may be selectively applied to an acquisition program.

Comments: A revision of this standard is in preparation by the Air Force and a draft, dated 6 May 92, has been circulated to the military departments and industry for coordination. The new version will be MIL-STD-499B, entitled *Systems Engineering*, and is in the approval process. The area/supply code for this document is AREA MISC.

Document #: MIL-STD-704E

Title: *Aircraft Electric Power Characteristics*

Key Word(s): Aircraft Electric Power Characteristics

Effective Date: 2 May 1991

Revision Level:	Rev E	02 May 1991
	Rev D Notice 1	31 Mar 1988
	Rev D	30 Sep 1980
	Rev C	30 Dec 1977
	Rev B	17 Nov 1975
	Rev A Notice 3	11 Apr 1973
	Original	06 Oct 1959

Supersedence: NA

Applicability: This standard is approved for use by all DoD components.

Purpose: The purpose of this standard is to ensure compatibility between the aircraft electric system, external power, and airborne utilization equipment.

Comments: This standard defines the requirements and describes the characteristics of aircraft electric power provided at the input terminals of electric utilization equipment. Power quality characteristics that relate to electromagnetic compatibility (EMC), such as distortion, load unbalance, ripple, transients, frequency and phase stability limits are specified in this standard. The area/supply code for this document is AREA MISC.

Document #: MIL-STD-781D

Title: *Reliability Testing for Engineering Development, Qualification and Production*

Key Word(s): Reliability Testing

Effective Date: 17 October 1986

Revision Level:	Rev D	17 Oct 1986
	Rev C Notice 1	20 Mar 1981
	Rev C	21 Oct 1977
	Rev B Notice 1	28 Jul 1969
	Rev A	10 Dec 1965
	Original	15 May 1963

Supersedence: NA

Applicability: This standard is approved for use by all DoD components.

Purpose: The purpose of this standard is to specify general requirements and specific tasks for reliability testing during the development, qualification, and production of systems and equipment.

Comments: This standard establishes the requirements for reliability testing performed during integrated test programs specified in MIL-STD-785. The area/supply code for this document is AREA RELI.

Document #: MIL-STD-889B

Title: *Dissimilar Metals*

Key Word(s): Metals

Effective Date: 17 May 1993

Revision Level:

Rev B Notice 3	17 May 1993
Rev B Notice 2	04 Mar 1988
Rev B Notice 1	21 Nov 1979
Rev B	07 Jul 1976
Rev A	05 May 1972
Original	25 Sep 1969

Supersedence: NA

Applicability: This standard is mandatory for use by all DoD components.

Purpose: The purpose of this standard is to define and classify dissimilar metals, and establish requirements for protecting coupled dissimilar metals, with attention directed to the anodic member of the couple, against corrosion.

Comments: The standard terms metals dissimilar when two metal specimens are in contact or otherwise electrically connected to each other in a conductive solution. The area/supply code for this document is AREA GDRQ.

Document #: MIL-STD-973

Title: *Configuration Management*

Key Word(s): Configuration Management

Effective Date: 1 December 1992

Revision Level:

Change Notice 1	01 Dec 1992
Original	17 Apr 1992

Supersedence: The following DoD and military standards are superseded by MIL-STD-973:
MIL-STD-480, *Configuration Control - Engineering Changes, Deviations, and Waivers*
MIL-STD-481, *Configuration Control - Short Form*
MIL-STD-482, *Configuration Status Accounting Data Elements and Related Features*
MIL-STD-483, *Configuration Management Practices*
MIL-STD-1456, *Configuration Management Plan*
MIL-STD-1521, *Technical Reviews and Audits for Systems, Equipments, and Computer Software* (Appendixes G, H, and I only).

Applicability: This standard applies to DoD activities and contractors tasked with the application of configuration management.

Purpose: The primary purpose of this document is to consolidate configuration management requirements previously scattered throughout several configuration management standards in the DoD inventory.

Comments: EMC analysis tasks involving both hardware and software are impacted by the changes in this new document. The area/supply code for this document is AREA CMAN.

Document #: MIL-STD-1399C

Title: *Interface Standard for Shipboard Systems*

Key Word(s): Shipboard Systems

Effective Date: 02 February 1988

Revision Level:	Rev C	02 Feb 1988
	Rev B	22 Nov 1977
	Rev A	20 Dec 1972
	Original	01 Dec 1970

Supersedence: NA

Applicability: This standard is approved for use by the Department of the Navy to develop plans, designs, and procurement specifications for new ship acquisitions, ship modernization or conversions, and systems/equipment.

Purpose: The purpose of this standard is to define the standard interface requirements (including those that affect EMC) for the design of ships and systems/equipment to be installed therein.

Comments: Certain MIL-STD-1399 series documents have also been designated as DoD standards, although used mainly by the Navy. The area/supply code for this document is FSC 1990.

Document #: MIL-STD-1399, Section 070, Part 1

Title: *Interface Standard for Shipboard Systems, Section 070, Part 1, DC Magnetic Field Environment (Metric)*

Key Word(s): Shipboard Systems

Effective Date: 30 November 1989

Revision Level:	Notice 1	30 Nov 1989
	Original	26 Feb 1979

Supersedence: NA

Applicability: This section of the standard is approved for use by all interested Commands of the Department of the Navy and is available for use by all DoD components.

Purpose: The purpose of this section of the standard is to define the interface requirements for, and the constraints on, the design of shipboard equipment whose performance may be degraded when subjected to the shipboard direct current magnetic field environment. This field is generated by the efforts (i.e., degaussing) to counteract the normal magnetic signature of a metallic ship.

Comments: Section 070 provides performance testing requirements and test procedures. The magnetic field generated by the efforts (i.e., degaussing) to counteract the normal magnetic signature of a metallic ship may have degrading effects on the performance of certain susceptible equipment. The area/supply code for this document is FSC 1990.

Document #: MIL-STD-1399, Section 300A

Title: *Interface Standard for Shipboard Systems Electric Power, Alternating Current*

Key Word(s): Shipboard Systems

Effective Date: 11 March 1992

Revision Level: Rev A Notice 1 11 Mar 1992
Rev A 13 Oct 1987
Original 01 Aug 1978

Supersedence: Revision A, including Notice 1, supersedes DoD STD-1399 Section 300, dated 1 August 1978.

Applicability: This section of the standard is approved for use by the Department of the Navy and is available for use by all DoD components.

Purpose: The purpose of this section of the standard is to define the standard interface requirements for, and the constraints on, the design of shipboard systems/equipment that will use shipboard alternating current (ac) electric power.

Comments: The area/supply code for this document is FSC 1990.

Document #: MIL-STD-1399, Section 390

Title: *Interface Standard for Shipboard Systems, Electric Power, Direct Current (Other Than Ships Battery) For Submarines (Metric)*

Key Word(s): Shipboard Systems

Effective Date: 2 October 1987

Revision Level: Original 02 Oct 1987

Supersedence: NA

Applicability: This section of the standard is approved for use by the Naval Sea Systems Command, and the Department of the Navy, and is available for use by all DoD components.

Purpose: The purpose of this section of the standard is to define and establish interface requirements for submarine equipments using dc electric power from sources other than the main storage battery to ensure compatibility between such user equipments and the power system and between individual user equipments.

Comments: This standard provides criteria for user EMI limits, power source EMI limits, and grounding isolation. It also describes methods of testing for EMI. The area/supply code for this document is FSC 1990.

Document #: MIL-STD-1399, Section 406A

Title: *Interface Standard for Shipboard Systems, Digital Computer Grounding*

Key Word(s): Shipboard Systems

Effective Date: 2 June 1982

Revision Level: Rev A 02 Jun 1982
Original 01 Dec 1976

Supersedence: NA

Applicability: This section of the standard is approved for use by the Department of the Navy and is available for use by all DoD components.

Purpose: The purpose of this section of the standard is to define the interface for grounding of shipboard digital computer systems.

Comments: The area/supply code for this document is FS 1990.

Document #: MIL-STD-1399A, Section 408

Title: *Interface Standard for Shipboard Systems, Section 408, Electromagnetic Radiation Hazards to Personnel and Fuels*

Key Word(s): Shipboard Systems

Effective Date: 16 July 1973

Revision Level: Rev A 16 Jul 1973

Supersedence: NA

Applicability: This section of the standard is approved for use by the Department of the Navy and is available for use by all DoD components.

Purpose: The purpose of this section of the standard is to define the standard interface requirements for ship design and layout, and the installation of systems/equipment that create electromagnetic radiation hazards onboard ship.

Comments: This section of the standard describes safety measures that shall be used for protection from radiation hazards such as RF burn, accidental fuel ignition, and personnel exposure. The area/supply code for this document is AREA MISC.

Document #: MIL-STD-1686B

Title: *Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices) (Metric)*

Key Word(s): Electrostatic Discharge

Effective Date: 31 December 1992

Revision Level: Rev B 31 Dec 1992
Rev A 08 Aug 1988
Original 02 May 1980

Supersedence: NA

Applicability: This standard is approved for use by all DoD components.

Purpose: The purpose of this standard is to establish the requirements for an electrostatic discharge (ESD) control program to minimize the effects of ESD on parts, assemblies, and equipment. An effective ESD control program will increase reliability, and decrease maintenance actions and lifetime cost. This standard may be tailored for various types of acquisitions.

Comments: This document covers control program requirements for ESD sensitive (ESDS) items susceptible to damage from discharges of up to 15,999 volts. Data Item Descriptions applicable to this standard are listed in Section 6 of this handbook. The area/supply code for this document is AREA REL1.

Document # MIL-STD-1695

Title: *Environments, Working Minimum Standards for*

Key Word(s): Environments

Effective Date: 9 September 1977

Revision Level: Original 09 Sep 1977

Supersedence: NA

Applicability: This standard is approved for the Department of the Navy, and is available for use by all DoD components.

Purpose: The purpose of this standard is to define minimum standards for working environments applicable to suppliers of military hardware.

Comments: The area/supply code for this document is AREA MISC.

3.4 EMC-RELATED MILITARY HANDBOOKS

Summaries of EMC-related military handbooks are presented in this subsection.

Document #: MIL-HDBK-245C

Title: *Preparation of Statement of Work (SOW)*

Key Word(s): SOW Preparation

Effective Date: 10 September 1991

Revision Level: Rev C 10 Sep 1991
 Rev B Int Notice 1 31 Dec 1987
 Rev B 01 Jun 1983
 Rev A 01 Aug 1978
 Original 01 Aug 1977

Supersedence: NA

Applicability: This handbook was developed by the Space and Naval Warfare Systems Command in accordance with established procedures and covers the preparation of Statements of Work (SOW) for inclusion in DoD solicitations and contract documents.

Purpose: The purpose of this handbook is to provide guidance in developing a SOW applicable to any material acquisition life-cycle phase. It also covers the SOW preparation for non-personal services contracts.

Comments: The specific instructions in this handbook provide techniques for defining task elements, such as EMC requirements, and a method for organizing these elements into a comprehensive SOW. The area/supply code for this document is AREA MISC.

Document #: MIL-HDBK-248B

Title: *Acquisition Streamlining*

Key Word(s): Acquisition Streamlining

Effective Date: 9 February 1989

Revision Level: Rev B 09 Feb 1989
 Rev A 15 Oct 1979
 Original 01 Apr 1977

Supersedence: MIL-STD-248B, *Acquisition Streamlining*, replaces DoD-HDBK-248A, *Guide for Application and Tailoring of Requirements for Defense Material Acquisitions*.

Applicability: This handbook is approved for all DoD components.

Purpose: The purpose of this handbook is to promote innovative and cost-effective acquisition requirements and strategies for the efficient use of resources to produce quality weapons systems and products.

Comments: The methodology to be used in the application and tailoring of the requirements of specifications and standards contractually imposed during the various phases of defense material acquisition are covered in MIL-HDBK-248B. The area/supply code for this document is AREA MISC.

Document #: MIL-HDBK-263A

Title: *Electrostatic Discharge Control Handbook for Protection of Electrical, and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices) (Metric)*

Key Word(s): Electrostatic Discharge

Effective Date: 22 February 1991

Revision Level: Rev A 22 Feb 1991
Original 02 May 1980

Supersedence: NA

Applicability: This handbook is approved for use by all DoD components.

Purpose: The purpose of this handbook is to provide guidance (not mandatory requirements) for the establishment and implementation of an Electrostatic Discharge (ESD) Control Program in accordance with the requirements of MIL-STD-1686. This document is applicable to the protection of electrical and electronic parts, assemblies and equipment from damage due to ESD.

Comments: Damaging electrostatic voltage levels are commonly generated by contact and subsequent separation of materials during industrial processes. The area/supply code for this document is AREA RELI.

Document #: MIL-HDBK-1012/1

Title: *Electronic Facilities Engineering*

Key Word(s): Electronic Facilities

Effective Date: 15 May 1989

Revision Level: Original 15 May 1989

Supersedence: DM-12.1, April 1983

Applicability: This handbook has been developed from an evaluation of facilities in the shore establishment, from surveys of the availability of new materials and construction methods, and from selection of the best design practices of the Naval Facilities Engineering Command (NAVFACENGCOM), other Government agencies, and the private sector. Deviations from these criteria in the planning, engineering, design and construction of Naval shore facilities cannot be made without prior approval of NAVFACENGCOM HQ (Code 04).

Purpose: The purpose of this handbook is to establish criteria for the design of electronic facilities.

Comments: EMC factors such as site location, grounding, bonding, and shielding are discussed in this handbook. Appropriate references are also provided. The area/supply code for this document is AREA FACR.

SECTION 4

MILITARY DEPARTMENT INTERNAL EMC-RELATED DOCUMENTS

4.1 INTRODUCTION

The documents listed in this section of the handbook are military departmental regulations, procedures, pamphlets, manuals, design standards, safety standards, reporting procedures and other types of documents that have been developed to achieve electromagnetic compatibility in military electronic systems.

The documents in this section address electromagnetic environmental effects (E^3) that include radiation hazards to personnel, ordnance, and fuel; electronic countermeasures; electromagnetic interference; and lightning. Still other documents in this section address frequency management procedures and acquisition procedures designed to reduce the impact of E^3 .

The individual military departments develop EMC-related documents in response to US Government regulations and DoD directives. The EMC-related documents developed by each military department are often more detailed than the general regulations and directives issued by the government and the DoD, but, in all cases, must be at least as stringent as the higher-level documents.

The individual commands, agencies, and organizations within each military department also issue more detailed regulatory documents in response to the documents issued by the military departments. Therefore, for each government or DoD regulatory document, a chain of documents down to the operational level is generated. Where possible, common documents are issued jointly by the military departments or by the commands or agencies within the departments.

Documents addressed in this section are usually developed or revised as a result of changes in government or DoD policy or changes in world wide stability. Also, development of new electronic systems and changes in deployment of weapons systems may trigger changes in the military department documents. Recent government policy with respect to procurement of commercial-off-the-shelf (COTS) equipment and use of industrial standards has resulted in changes in existing standards or development of new regulations/instructions in the military departments. Without an event to trigger a change in these documents, there may be no scheduled update and the documents may stand for several years.

The information available for documents listed in this section is not as comprehensive as that provided for some of the documents described in other sections of this handbook. The documents may only be a few pages and may only be in effect for a short time. They do not have the wide dissemination that a military standard may have. For these documents, there is no joint military comprehensive listing such as the Department of Defense Index of Specifications and Standards (DoDISS). However, for documents in this section, a listing of dates, revisions, notices or other changes is provided. Other information in this section listing includes applicability, purpose of the documents and comments, if appropriate.

Air Force EMC-related documents are listed in Table 4-1 and described in Section 4.2, Army EMC-related documents are listed in Table 4-2 and described in Section 4.3, and Navy and Marine Corps EMC-related documents are listed in Table 4-3 and described in Section 4.4.

Table 4-1. US Air Force Internal EMC-Related Documents

AFI 10-206	<i>Reporting Instructions</i>
AFI 10-701	<i>Performing Electronic Attack in the United States and Canada</i>
AFI 10-707	<i>Spectrum Interference Resolution</i>
AFI 33-108	<i>Compatibility and Interoperability of Tactical Command, Control, Communications, and Intelligence Systems</i>
AFI 33-118	<i>Radio Frequency Spectrum Management</i>
AFI 91-204	<i>Investigating and Reporting USAF Mishaps</i>
AFI 63-113	<i>Acquisition Program Management</i>
AFI 91-107	<i>Safety Design and Evaluation Criteria for Nuclear Weapons Systems</i>
AFI 62-201	<i>The Air Force Survivability Program</i>
AFM 91-201	<i>Explosive Safety Standards</i>
AFMC COTS	<i>Commercial Off the Shelf (COTS) Procurement Guide</i>
AFOSH Standard 127-38	<i>Hydrocarbon Fuels-General</i>
AFOSH Standard 127-43	<i>Flammable & Combustible Liquids</i>
AFOSH Standard 127-45	<i>Hazardous Energy Control and Mishap Prevention Signs and Tags</i>
AFOSH Standard 161-9	<i>Exposure to Radiofrequency Radiation</i>
AFOSH-Standard-161-10	<i>Health Hazards Control for Laser Radiation</i>
AFR 55-3	<i>Reporting Meaconing, Intrusion, Jamming and Interference of Electromagnetic Systems</i>
AFR 55-44	<i>Performing Electronic Countermeasures (ECM) in the United States and Canada</i>
AFR 55-55	<i>US Air Force Reporting Instructions</i>
AFR 80-23	<i>The US Air Force Electromagnetic Compatibility Program</i>
AFR 80-38	<i>The Air Force Survivability Program</i>
AFR 100-10	<i>Electronic Counter-Countermeasures for Command and Control Communications Systems (U)</i>
AFR 122-10	<i>Safety Design and Evaluation Criteria for Nuclear Weapons Systems</i>
AFR 127-4	<i>Investigating and Reporting USAF Mishaps</i>
AFR 127-100	<i>Explosive Safety Standards</i>
AFR 700-14	<i>Radio Frequency Spectrum Management</i>
AFR 700-52	<i>Compatibility and Interoperability of Tactical Command, Control, Communications, and Intelligence Systems</i>
AFR 800-2	<i>Acquisition Program Management</i>
AF TO 31Z-10-4	<i>Electromagnetic Radiation Hazards</i>
AFSC DH 1-4	<i>AFSC EMC Design Handbook</i>

Table 4-2. US Army Internal EMC-Related Documents

AAE PAM 91-3	<i>Army Acquisition Executive (AAE) Policy Memorandum 91-3, Army Electromagnetic Environmental Effects (E³) Program Implementation</i>
AMC-TRADOC PAM 70-2	<i>Material Acquisition Handbook, United States Army (NDI)</i>
AR 5-12	<i>Army Management of the Electromagnetic Spectrum</i>
AR 25-3	<i>Army Life Cycle Management of Information Systems</i>
AR 40-583	<i>Control of Potential Hazards to Health from Microwave and Radio Frequency Radiation</i>
AR 70-1	<i>Army Acquisition Policy</i>
AR 70-60	<i>Nuclear Survivability of Army Materiel</i>
AR 105-3	<i>Reporting Meaconing, Intrusion, Jamming and Interference of Electromagnetic Systems, RCS; JCS-1066 (MIN)</i>
AR 385-63	<i>Policies and Procedures for Firing Ammunition for Training, Target Practice and Combat</i>
AR 525-20	<i>Command Control, Communications, and Countermeasures (C³ CM) Policy</i>
ARADCOM 105-9	<i>Communications-Electronics Electromagnetic Radiation (U)</i>
DA ADS-37	<i>Aeronautical Design Standard, Electromagnetic Environmental Effects (E³) Management, Design and Test Requirements</i>
DA FM 5-25	<i>Explosives and Demolitions</i>
DA FM 11-490-30	<i>Electromagnetic Radiation Hazards</i>
DA FM 24-2	<i>Spectrum Management</i>
DA MICOM TR RD-TE-87-1	<i>Electromagnetic Environmental Criteria for US Army Missile Systems: EMC, EMR, EMI, EMP, ESD, and Lightning</i>
DA PAM 70-XXX (D) (E ³)	<i>Electromagnetic Environmental Effects (E³) and Survivability Programs</i>
DA TB-MED 523	<i>Control of Hazards to Health from Microwave and Radio Frequency Radiation and Ultrasound</i>
DA TB-MED 524	<i>Occupational and Environmental Health Control of Hazards from Laser Radiation</i>
DARCOM-P 706-235	<i>Hardening Weapons Systems Against RF Energy</i>
DARCOM-P 706-410	<i>Engineering Design Handbook, Electromagnetic Compatibility</i>

Table 4-3. US Navy/Marine Corps Internal EMC-Related Documents

MC NDI HDBK	<i>Non-Developmental Item Handbook, United States Marine Corps</i>
MCO 2400.2	<i>Marine Corps Management of the Radio Frequency Spectrum</i>
MCO 2410.2A	<i>Electromagnetic Environmental Effects Control Program</i>
NAVAIRINST 2410.1D	<i>Electromagnetic Environmental Effects (E³) Control Within the Naval Air Systems Command (NAVAIR)</i>
NAVAIRINST 3430.2	<i>Tactical Air Electronic Warfare Threat Emitter Listing Standardization Program</i>
NAVAIRINST 8020.4B	<i>Hazards of Electromagnetic Radiation to Ordnance Program</i>
NAVFACINST 11012.113B	<i>Electromagnetic Environmental Effects (E³) Program</i>
NAVSEAINST 2450.2	<i>Electromagnetic Compatibility (EMC)</i>
NAVSEAINST 8020.7B	<i>Hazards of Electromagnetic Radiation to Ordnance (HERO) Safety Program</i>
NAVSEA OP3565	<i>Electromagnetic Radiation Hazards (U), Volume 1,</i>
NAVELEX 0967-LP-624-6010	<i>Hazards to Personnel, Fuel (U), and other</i>
NAVAIR 16-1-1529	<i>Flammable Material, Volume 2, Hazards to Ordnance (U)</i>
NAVSO P-3656	<i>Department of the Navy Handbook for Implementation of Non-Developmental Item (NDI) Acquisition</i>
NAVTELINST 2400.1	<i>Management and Use of the Radio Frequency Spectrum Within the Department of the Navy (DON)</i>
NTP 6(D)	<i>Spectrum Management Manual</i>
OPNAVINST 2400.20E	<i>Navy Management of the Radio Frequency Spectrum</i>
OPNAVINST 2400.25	<i>National Emergency Readiness Plan for the Use of the Radio Spectrum</i>
OPNAVINST C2450.1	<i>Department of the Navy (DON) Electromagnetic Compatibility (EMC) Management Program for SIGINT Sites (U)</i>
OPNAVINST 2450.2	<i>Electromagnetic Compatibility Program Within the Department of the Navy (DON)</i>
OPNAVINST 3430.9C	<i>Performing Electronic Countermeasures in the United States and Canada</i>
OPNAVINST C3430.18D	<i>Reporting, Meaconing, Intrusion, Jamming, and Interference of Electromagnetic Systems</i>
OPNAVINST 3430.19	<i>Electromagnetic Performance of Aircraft and Ships Systems (EMPASS), Procedures for Obtaining Services of</i>
OPNAVINST 5100.23C	<i>Navy Occupational and Health (NAVOSH) Program Manual, Chapter 22, Radiation</i>
OPNAVINST 9410.6	<i>Naval Warfare Tactical Database (NWTDB) Requirements for Tactical Naval Warfare Systems</i>
SECNAVINST 2410.1B	<i>Electromagnetic Compatibility Program Within the Department of the Navy</i>
SECNAVINST C3430.1A	<i>Quick Reaction Capability (QRC) Policy for Electronic Warfare and Related Systems, Establishment of (U)</i>
SECNAVINST C3430.2	<i>Department of the Navy Policy for Electronic Counter-Countermeasures (ECCM) in Electronic Systems (U)</i>
SECNAVINST 4210.6A	<i>Acquisition Policy</i>
SECNAVINST 4210.7A	<i>Effective Acquisition of Navy Material</i>
SPAWARINST 5100.12A	<i>Navy Laser Radiation Hazard Prevention Program</i>
SPAWARINST 5101.1	<i>Non-ionizing Electromagnetic Radiation (EMR) Hazard Control Within the Naval Electronics Systems Command</i>

4.2 US AIR FORCE INTERNAL EMC-RELATED DOCUMENTS

Summaries of EMC-related Air Force instructions, standards, regulations, technical orders, and handbooks are presented in this subsection.

Document #: AFI 10-206
Title: *Reporting Instructions*
Key Word(s): Reporting Instructions
Effective Date: April 1994
Revision Level: Original
Supersedence: This instruction supersedes AFR 55-55.
Applicability: This instruction applies to all agencies of the Air Force.
Purpose: The purpose of this instruction is to provide instructions for standard reporting of incidents involving safety and mission performance.
Comments: None

Document #: AFI 10-701
Title: *Performing Electronic Attack in the United States and Canada*
Key Word(s): ECM
Effective Date: To Be Supplied
Revision Level: Original
Supersedence: This instruction is expected to supersede AFR 55-44.
Applicability: This instruction is applicable to AF operations personnel performing ECM in the US and Canada.
Purpose: The purpose of this instruction is to specify procedures for operation of ECM equipment.
Comments: None

Document #: AFI 10-707

Title: *Spectrum Interference Resolution*

Key Word(s): Jamming, Interference

Effective Date: April 1994

Revision Level: Original

Supersedence: This instruction supersedes AFR 55-3, dated 31 July 1986.

Applicability: This instruction is applicable to Air Force, Army, Navy and Marine Corps command elements that operate equipment that radiates or receives electromagnetic energy throughout the frequency spectrum.

Purpose: The purpose of this instruction is to provide a standard format for reporting incidents of Meaconing, Intrusion, Jamming and Interference to the Joint Electronic Warfare Center (JEWEC) for analysis and for inclusion in a database of instances.

Comments: Common regulations for the other military departments are:

Army	AR105-3
Navy	OPNAV INST 3430.18D
Marine Corps	MCO 3430.3 C

Document #: AFI 33-108

Title: *Compatibility and Interoperability of Tactical Command, Control, Communications, and Intelligence Systems*

Key Word(s): Tactical Command, Control, Communications, and Intelligence Systems

Effective Date: To Be Supplied

Revision Level: Original

Supersedence: This instruction supersedes AFR 700-52.

Applicability: This instruction applies to commands responsible for procurement of tactical command, control, communications and intelligence systems.

Purpose: The purpose of this instruction is to ensure that compatibility and interoperability are included in the procurement of tactical command, control, communications, and intelligence systems being procured by the Air Force.

Comments: None

Document #: AFI 33-118

Title: *Radio Frequency Spectrum Management*

Key Word(s): Spectrum Management

Effective Date: June 1994

Revision Level: Original

Supersedence: This instruction supersedes AFR 700-14.

Applicability: This instruction applies to all Air Force activities that use the electromagnetic spectrum, including US Air Force Reserve and Air National Guard Units and members.

Purpose: The purpose of this instruction is to provide policy, guidance and procedures for Air Force management of the electromagnetic spectrum. It assists in system planning, tells how to obtain frequency support for new systems and lists procedures for frequency allocations and assignments. This instruction implements DoD Directive 4650.1.

Comments: None

Document #: AFI 62-201

Title: *The Air Force Survivability Program*

Key Word(s): Survivability

Effective Date: To Be Supplied

Revision Level: Original

Supersedence: This instruction is expected to supersede AFR 80-38.

Applicability: This instruction is applicable to all elements of the US Air Force.

Purpose: The purpose of this instruction is to establish policy and procedures for conducting the Air Force Survivability Program.

Comments: None

Document #: AFI 63-113

Title: *Acquisition Program Management*

Key Word(s): Acquisition

Effective Date: To Be Supplied

Revision Level: Original

Supersedence: This instruction is expected to supersede AFR 800-2.

Applicability: This instruction is applicable to command elements in the Air Force responsible for acquisition program management.

Purpose: The purpose of this instruction is to ensure that good acquisition management procedures are followed by Air Force program managers.

Comments: None

Document #: AFI 91-107

Title: *Safety Design and Evaluation Criteria for Nuclear Weapons Systems*

Key Word(s): Nuclear Weapons

Effective Date: April 1994

Revision Level: Original

Supersedence: This instruction supersedes AFR 122-10.

Applicability: This instruction is applicable to Air Force elements engaged in the design and evaluation of nuclear weapons systems.

Purpose: The purpose of this instruction is to evaluation criteria to ensure safety design of nuclear weapons systems.

Comments: None

Document #: AFI 91-204

Title: *Investigating and Reporting USAF Mishaps*

Key Word(s): Mishaps

Effective Date: To Be Supplied

Revision Level: Original

Supersedence: This instruction is expected to supersede AFR 127-4.

Applicability: This instruction applies to all US Air Force operational elements that investigate and report mishaps.

Purpose: The purpose of this instruction is to ensure that all details of USAF mishaps are reported in a standard format.

Comments: None

Document #: AFM 91-201

Title: *Explosive Safety Standards*

Key Word(s): Explosives

Effective Date: To Be Supplied

Revision Level: Original

Supersedence: This instruction supersedes AFR 127-100.

Applicability: This instruction is to be used by Air Force personnel and organizations whose responsibilities and activities involve explosives. Safe separation distance criteria provided in this instruction are also used by the Army.

Purpose: This instruction establishes safety criteria for operations involving explosives and provides guidance for establishing an explosive mishap prevention program.

Comments: For pulsed systems, the criteria provided in this instruction are presented in terms of peak or average power, depending on the pulsewidth of the system.

Document #: AFMC COTS

Title: *Commercial Off the Shelf (COTS) Procurement Guide*

Key Word(s): COTS

Effective Date: January 1993

Revision Level: Original Jan 1993

Supersedence: NA

Applicability: This document is applicable to the US Air Force for procurement of non-developmental items.

Purpose: The purpose of this document is to provide guidance and criteria for the identification, selection, acquisition, logistic support, and testing of the various categories of commercial equipment, computer resources, and software.

Comments: An Air Force supplement to DoDI 5000.2, *Defense Acquisition Management Policies and Procedures*, 23 February 1992, to address procurement of COTS is being drafted.

Document #: AFOSH Standard 127-38

Title: *Hydrocarbon Fuels-General*

Key Word(s): Fuels

Effective Date: 1 April 1985

Revision Level: Change 2 01 Apr 1985
Change 1 04 May 1983
Original 07 Feb 1980

Supersedence: This standard supersedes AFOSH Standard 127-38, dated 25 July 1978.

Applicability: This standard encompasses all areas of Class I, Class II and Class IIIA hydrocarbon fuel operations, storage and maintenance. The safety requirements in this standard apply to all personnel involved in handling the above specified fuels.

Purpose: This standard classifies flammable and combustible liquids and specifies the procedures for safe handling of these compounds. Criteria for hazards of electromagnetic energy to fuel (HERF) and safe operating distances are discussed.

Comments: This standard also discusses grounding and bonding criteria for control of ignition of fuels due to static electricity. The procedures for establishing safe operating distances to preclude hazards from electromagnetic energy are provided in AFTO-31Z-10-4.

Document #: AFOSH Standard 127-43

Title: *Flammable & Combustible Liquids*

Key Word(s): Combustible Liquids

Effective Date: 21 September 1980

Revision Level: Original 21 Sep 1980

Supersedence: NA

Applicability: This standard applies to Air Force operational forces responsible for handling flammable and combustible liquids.

Purpose: The purpose of this standard is to define safe handling practices for Air Force personnel responsible for handling flammable and combustible liquids.

Comments: None

Document #: AFOSH Standard 127-45

Title: *Hazardous Energy Control and Mishap Prevention Signs and Tags*

Key Word(s): Energy Control

Effective Date: 1 November 1990

Revision Level: Notice 1 1 Nov 1990

Supersedence: NA

Applicability: This standard is applicable to those responsible for safety at Air Force facilities where hazardous energy levels may be encountered.

Purpose: The purpose of this standard is to detail the warning signs to be placed in the vicinity of hazardous energy levels for prevention of mishaps.

Comments: None

Document #: AFOSH Standard 161-9

Title: *Exposure to Radiofrequency Radiation*

Key Word(s): Radiation

Effective Date: 12 February 1987

Revision Level: Update 12 Feb 1987
Original 12 Oct 1984

Supersedence: This standard supersedes AFOSH Standard 161-9, dated 12 October 1984.

Applicability: Everyone (military, civilian, foreign national) who is directly or indirectly responsible for the safe operation of RF radiating equipment owned or operated by the US Air Force must comply with this standard. This standard is also applicable to the US Army.

Purpose: The purpose of this standard is to present methods for preventing harmful exposures of personnel to electromagnetic energy emitted at frequencies from 10 kHz to 300 GHz and procedures to be followed if persons are over exposed to RF radiation.

Comments: The permissible exposure levels in this standard implement DoD Instruction 6055.11, *Protection of DoD Personnel from Exposure to Radiofrequency Radiation*, 20 August 1986. The criteria in DODI 6055.11 were derived from ANSI C95.1-1982, *American National Standard Safety Levels with Respect to Human Exposure to Radiofrequency Electromagnetic Fields, 300 kHz to 100 GHz* 30 July 1982.

Document #: AFOSH-Standard-161-10

Title: *Health Hazards Control for Laser Radiation*

Key Word(s): Laser Radiation

Effective Date: 30 May 1980

Revision Level: Change 3 30 May 1980

Supersedence: NA

Applicability: This standard is applicable to Air Force organizations utilizing lasers.

Purpose: The purpose of this standard is to establish a program to prevent possible harmful effects to personnel resulting from exposure to laser radiation.

Comments: None

Document #: AFR 55-3

Title: *Reporting Meaconing, Intrusion, Jamming and Interference of Electromagnetic Systems*

Key Word(s): Jamming, Interference

Effective Date: 31 July 1986

Revision Level: Update 31 Jul 1986
Original 03 Aug 1984

Supersedence: This document is superseded by AFI 10-707.

Applicability: This regulation is applicable to Air Force, Army, Navy and Marine Corps command elements that operate equipment that radiates or receives electromagnetic energy throughout the frequency spectrum.

Purpose: The purpose of this regulation is to provide a standard format for reporting incidents of Meaconing, Intrusion, Jamming and Interference to the Joint Electronic Warfare Center (JEWEC) for analysis and for inclusion in a database of instances.

Comments: Common regulations for the other military departments are:

Army	AR105-3
Navy	OPNAV INST 3430.18D
Marine Corps	MCO 3430.3 C

A new number/title has been assigned to this document by the Air Force. It is now AFI 10-707, *Spectrum Interference Resolution*.

Document #: AFR 55-44

Title: *Performing Electronic Countermeasures (ECM) in the United States and Canada*

Key Word(s): ECM

Effective Date: 17 August 1983

Revision Level: Change 2 17 Aug 1983
Change 1 03 Jul 1980
Original 06 Dec 1978

Supersedence: This document is is expected to be superseded by AFI 10-701.

Applicability: This regulation is applicable to AF operations personnel performing ECM in the US and Canada.

Purpose: The purpose of this document is to specify procedures for operation of ECM equipment.

Comments: A new number/title has been assigned to this document by the Air Force. It is now AFI 10-701, *Performing Electronic Attack in the United States and Canada*.

Document #: AFR 55-55

Title: *US Air Force Reporting Instructions*

Key Word(s): Reporting Instructions

Effective Date: September 1992

Revision Level: Change 1 Sep 1992
Original May 1990

Supersedence: This document is superseded by AFI 10-206.

Applicability: This regulation applies to all agencies of the Air Force.

Purpose: The purpose of this regulation is to provide instructions for standard reporting of incidents involving safety and mission performance.

Comments: A new number/title has been assigned to this document by the Air Force. It is now AFI 10-206, *Reporting Instructions*.

Document #: AFR 80-23

Title: *The US Air Force Electromagnetic Compatibility Program*

Key Word(s): EMC, Air Force Electromagnetic Compatibility Program

Effective Date: 29 March 1982

Revision Level: Original 29 Mar 1982

Supersedence: This regulation is superseded by Air Force Supplement 1 to DoD Directive 3222.3, dated 6 December 1993.

Applicability: This publication applies to Air Force activities that plan, design, develop, lease, procure, select sites for, install, operate, modify or maintain electronic, electrical, telecommunications equipment, subsystems, and systems, or other ground and aerospace equipment that are susceptible to, or are capable of, creating electromagnetic interference.

Purpose: The purpose of this publication is to outline the Air Force EMC Program, which is designed to achieve EMC of all electronic and electrical equipment, subsystems, and systems operated in any electromagnetic environment by the Air Force.

Comments: None

Document #: AFR 80-38

Title: *The Air Force Survivability Program*

Key Word(s): Survivability

Effective Date: 29 September 1989

Revision Level: Revision 29 Sep 1989
Original 02 Aug 1982

Supersedence: This document is expected to be superseded by AFI 62-201.

Applicability: This document is applicable to all elements of the US Air Force.

Purpose: The purpose of this regulation is to establish policy and procedures for conducting the Air Force Survivability Program.

Comments: None

Document #: AFR 100-10

Title: *Electronic Counter-Countermeasures for Command and Control Communications Systems (U)*

Key Word(s): ECCM

Effective Date: October 1978

Revision Level: Rescinded 5 Jul 1994
Original Oct 1978

Supersedence: This document is rescinded, AF Index 2, 5 July 1994.

Applicability: This document is applicable to commanders of Air Force Command and Control Communications Systems.

Purpose: The purpose of this document is to provide guidance for use of electronic counter-countermeasures for command and control communications systems.

Comments: None

Document #: AFR 122-10

Title: *Safety Design and Evaluation Criteria for Nuclear Weapons Systems*

Key Word(s): Nuclear Weapons

Effective Date: May 1990

Revision Level: Original May 1990

Supersedence: This document is superseded by AFI 91-107.

Applicability: This regulation is applicable to Air Force elements engaged in the design and evaluation of nuclear weapons systems.

Purpose: The purpose of this regulation is to evaluation criteria to ensure safety design of nuclear weapons systems.

Comments: None

Document #: AFR 127-4

Title: *Investigating and Reporting USAF Mishaps*

Key Word(s): Mishaps

Effective Date: January 1990

Revision Level: Original Jan 1990

Supersedence: This document is expected to superseded by AFI 91-204.

Applicability: This regulation applies to all US Air Force operational elements that investigate and report mishaps.

Purpose: The purpose of this regulation is to ensure that all details of USAF mishaps are reported in a standard format.

Comments: None

Document #: AFR 127-100

Title: *Explosive Safety Standards*

Key Word(s): Explosives

Effective Date: 3 August 1990

Revision Level: Revised 03 Aug 1990
Original 20 May 1983

Supersedence: This document is superseded by AFM 91-201.

Applicability: This regulation is to be used by Air Force personnel and organizations whose responsibilities and activities involve explosives. Safe separation distance criteria provided in this regulation are also used by the Army.

Purpose: This regulation establishes safety criteria for operations involving explosives and provides guidance for establishing an explosive mishap prevention program.

Comments: For pulsed systems, the criteria provided in this regulation are presented in terms of peak or average power, depending on the pulsewidth of the system.

Document #: AFR 700-14

Title: *Radio Frequency Spectrum Management*

Key Word(s): Spectrum Management

Effective Date: July 1989

Revision Level: Revised Jul 1989
Original 15 Dec 1987

Supersedence: This document is superseded by AFI 33-118.

Applicability: This regulation applies to all Air Force activities that use the electromagnetic spectrum, including US Air Force Reserve and Air National Guard Units and members.

Purpose: The purpose of this regulation is to provide policy, guidance and procedures for Air Force management of the electromagnetic spectrum. It assists in system planning, tells how to obtain frequency support for new systems, and lists procedures for frequency allocations and assignments. This regulation implements DoD Directive 4650.1.

Comments: None

Document #: AFR 700-52

Title: *Compatibility and Interoperability of Tactical Command, Control, Communications, and Intelligence Systems*

Key Word(s): Tactical Command, Control, Communications, and Intelligence Systems

Effective Date: March 1989

Revision Level: Original Mar 1989

Supersedence: This document is superseded by AFI 33-108.

Applicability: This regulation applies to commands responsible for procurement of tactical command, control, communications, and intelligence systems.

Purpose: The purpose of this regulation is to ensure that compatibility and interoperability are included in the procurement of tactical command, control, communications, and intelligence systems being procured by the Air Force.

Comments: None

Document #: AFR 800-2

Title: *Acquisition Program Management*

Key Word(s): Acquisition

Effective Date: March 1986

Revision Level: Change 1 Mar 1986
Original Sep 1985

Supersedence: This document is expected to superseded by AFI 63-113.

Applicability: This regulation is applicable to Air Force command elements responsible for acquisition program management.

Purpose: The purpose of this regulation is to ensure that good acquisition management procedures are followed by Air Force program managers.

Comments: None

Document #: AF TO 31Z-10-4

Title: *Electromagnetic Radiation Hazards*

Key Word(s): Radiation

Effective Date: 19 January 1989

Revision Level:	Change 5	19 Jan 1989
	Change 4	11 Dec 1987
	Change 3	27 Aug 1985
	Change 2	15 Mar 1985
	Change 1	1 Mar 1983
	Original	15 Oct 1981

Supersedence: NA

Applicability: This document is applicable to all elements of the Air Force and Army.

Purpose: The purpose of this document is to familiarize personnel with EM radiation hazards and hazard control and to provide technical guidance for personnel involved in prediction and/or measurement of EM radiation hazards.

Comments: AF TO 31Z-10-4 is a common document with Army FM 11-490-30. This document covers RF hazards to personnel, fuel and electroexplosive devices (EED). Also covered are X-ray hazards, infrared hazards, laser hazards, toxicity hazards, radioactive material hazards, and the calculation of safe separation distances from hazards.

Document #: AFSC DH 1-4

Title: *AFSC EMC Design Handbook*

Key Word(s): EMC Design

Effective Date: 15 July 1987

Revision Level: Revised periodically.

Supersedence: NA

Applicability: This handbook is applicable to those responsible for design/procurement of electronics systems for the Air Force.

Purpose: The purpose of this handbook is to provide guidance for good design practices in the development of electronics systems procured by the Air Force.

Comments: None

4.3 US ARMY INTERNAL EMC-RELATED DOCUMENTS

Summaries of EMC-related Army pamphlets, regulations, standards, field manuals, technical reports, and technical bulletins are presented in this subsection.

Document #: AAE PAM 91-3

Title: *Army Acquisition Executive (AAE) Policy Memorandum 91-3, Army Electromagnetic Environmental Effects (E³) Program Implementation*

Key Word(s): Electromagnetic Environmental Effects

Effective Date: 22 January 1991

Revision Level: Original 22 Jan 1991

Supersedence: NA

Applicability: This document applies to Army acquisition executives.

Purpose: The purpose of this document is to ensure that electromagnetic environmental effects are properly addressed in acquisition programs.

Comments: None

Document #: AMC-TRADOC PAM 70-2

Title: *Material Acquisition Handbook, United States Army (NDI)*

Key Word(s): Acquisition

Effective Date: March 1987

Revision Level: Original Mar 1987

Supersedence: NA

Applicability: This document is applicable for all Army acquisition of nondevelopmental items.

Purpose: The purpose of this document is to provide guidance to program managers when selecting non-developmental items for Army use.

Comments: None

Document #: AR 5-12

Title: *Army Management of the Electromagnetic Spectrum*

Key Word(s): Spectrum Management

Effective Date: 15 June 1983

Revision Level: Reissued 15 Jan 1988
 Update 5 Jun 1983
 Original 23 Jan 1978

Supersedence: This regulation supersedes AR 5-12, dated 23 January 1978, and AR 105-16, dated 20 December 1973.

Applicability: This regulation applies to the Active Army, the National Guard, and the US Army Reserve.

Purpose: The purpose of this regulation is to issue Army policy and assign responsibility for Army management of the electromagnetic spectrum. It also assigns responsibilities and establishes procedures for Army participation in Joint Military, National and International Spectrum Management activities.

Comments: This regulation was reissued on 15 January 1988, and currently is being updated.

Document #: AR 25-3

Title: *Army Life Cycle Management of Information Systems*

Key Word(s): Information Systems

Effective Date: 15 October 1989

Revision Level: Original 15 Oct 1989

Supersedence: NA

Applicability: This document is applicable to the Army elements responsible for life-cycle management of information systems.

Purpose: The purpose of this document is to provide guidance for life-cycle management of information systems.

Comments: None

Document #: AR 40-583

Title: *Control of Potential Hazards to Health from Microwave and Radio Frequency Radiation*

Key Word(s): Microwave Radiation Hazards, RF Radiation Hazards

Effective Date: 1 May 1981

Revision Level: Update 01 May 1981
Original 14 Aug 1975

Supersedence: This regulation supersedes AR 40-583, dated 14 August 1975, and AR 40-44, dated 31 March 1977.

Applicability: This regulation is applicable to the Active Army, Army National Guard, and US Army Reserve.

Purpose: The purpose of this regulation is to provide policies, procedures and standards to protect personnel from hazards to health from microwave and RF radiation.

Comments: The criteria for radiated levels from microwave ovens, given in this regulation, are still valid. Consult current AFOSH STANDARD 161-9 for personnel exposure levels.

Document #: AR 70-1

Title: *Army Acquisition Policy*

Key Word(s): Acquisition

Effective Date: 31 March 1993

Revision Level: Update 31 Mar 1993
Original

Supersedence: This regulation supersedes and consolidates previous issues of AR 15-14, AR 70-1, AR 70-2, AR 70-15, AR 70-17, AR 70-37, AR 70-64 and AR 70-72.

Applicability: This regulation applies to the Active Army, the Army National Guard, and the US Army Reserve. It also applies to weapon systems, C³I and EW systems, special access programs, and computer resources integral to those items or systems. It also applies to personnel conducting research, development or acquisition of material items and systems.

Purpose: The purpose of this regulation is to implement the Army's acquisition policy according to DoDD 5000.1, DoDI 5000.2 and DoD 5000.2-M.

Comments: None

Document #: AR 70-60

Title: *Nuclear Survivability of Army Materiel*

Key Word(s): Survivability

Effective Date: 1 November 1984

Revision Level: Update 01 Nov 1984
Original 20 Sep 1977

Supersedence: This regulation supersedes AR 70-60, dated 20 September 1977.

Applicability: This regulation applies to Active Army and to all proponent agencies of research, development, test, evaluation, and acquisition; logistical support; product improvement; doctrine; and training. It does not apply to the Army National Guard or the US Army Reserve.

Purpose: The purpose of this regulation is to establish policies and procedures to ensure that all mission-essential Army materiel is considered for hardening against initial nuclear weapons effects.

Comments: None

Document #: AR 105-3

Title: *Reporting Meaconing, Intrusion, Jamming and Interference of Electromagnetic Systems, RCS; JCS-1066 (MIN)*

Key Word(s): Jamming, MIJI

Effective Date: 31 July 1986

Revision Level: Update 31 Jul 1986
Original 03 Aug 1984

Supersedence: This regulation supersedes AR 105-3, dated 3 August 1984.

Applicability: This regulation responds to the JCS tasking in SM 567-83 and applies to all military services and each of their command subordinate elements (including Reserve and National Guard components) that operate equipment radiating or receiving electromagnetic emissions throughout the frequency spectrum.

Purpose: The purpose of this regulation is to set up procedures for reporting incidents of meaconing, intrusion, jamming and interference (MIJI) to US military electromagnetic systems.

Comments: This is a joint regulation with the Air Force AFR 55-3, Navy OPNAV INST 3430.18D, and Marine Corps MCO 3430.3C.

Document #: AR 385-63

Title: *Policies and Procedures for Firing Ammunition for Training, Target Practice and Combat*

Key Word(s): Ammunition

Effective Date: 15 November 1983

Revision Level: Update 15 Nov 1983
Original 22 Feb 1978

Supersedence: This regulation supersedes AR 385-63, dated 22 February 1978.

Applicability: This regulation applies to range or firing activities of the Active Army, US Military Academy, Army National Guard, US Army Reserve and Army Reserve Officers' Training Corps located on or within a military installation.

Purpose: The purpose of this regulation is to incorporate revised ballistic data affecting surface danger zone diagrams for small arms, incorporate new standardized range design for hand grenade ranges, and clarify combined arms live-fire exercises and laser operations.

Comments: Chapter 19 of the regulation covers hazards to personnel from laser devices. Also Appendix B provides laser information for Unit Laser Range Safety Officers.

Document #: AR 525-20

Title: *Command Control, Communications, and Countermeasures (C³ CM) Policy*

Key Word(s): Countermeasures

Effective Date: 31 July 1992

Revision Level: Update 31 Jul 1992
Original 01 Aug 1981

Supersedence: This regulation supersedes AR 525-20, dated 1 August 1981.

Applicability: This regulation applies to the active Army, US Army Reserve, and Army National Guard.

Purpose: The purpose of this document is to define C³CM and describe its role in combat operations, identify objectives, set forth prescribed policy, and assign responsibilities.

Comments: None

Document #: ARADCOM 105-9

Title: *Communications-Electronics Electromagnetic Radiation (U)*

Key Word(s): Radiation

Effective Date: 6 September 1973

Revision Level: Update 06 Sep 1973
Original 04 Mar 1970

Supersedence: This regulation supersedes ARADCOM Reg 105-9, dated 4 March 1970.

Applicability: This regulation applies to the US Army Air Defense Command.

Purpose: The purpose of this regulation is to establish policy and procedures for minimizing the effects of electromagnetic radiation on ARADCOM weapons and weapon systems.

Comments: This regulation pertains to weapon systems no longer in the Army inventory. Computation methods for separation distances are valid.

Document #: DA ADS-37

Title: *Aeronautical Design Standard, Electromagnetic Environmental Effects (E³) Management, Design and Test Requirements*

Key Word(s): Electromagnetic Environmental Effects

Effective Date: 16 April 1990

Revision Level: Original

Supersedence: NA

Applicability: This standard is applicable to the US Army Aviation System Command.

Purpose: The purpose of this document is to establish electromagnetic environmental effects (E³) design and test criteria for implementation at all stages in the lifecycle of aircraft systems, subsystems, and components (to include engineering changes and production improvements).

Comments: None

Document #: DA FM 5-25

Title: *Explosives and Demolitions*

Key Word(s): Explosives

Effective Date: 5 February 1971

Revision Level: Update 05 Feb 1971
Original 26 May 1967

Supersedence: This manual supersedes FM 5-25, dated 26 May 1967.

Applicability: This manual is applicable to the Active Army, Army National Guard, and US Army Reserve.

Purpose: The purpose of this manual is to provide a guide for the safe use of explosives in the destruction of military obstacles and other structures.

Comments: This manual defines criteria for minimum safe separation distance between explosives and radio transmitters and power lines. Lightning hazards to explosives are discussed. Power requirements for series firing circuits are also discussed.

Document #: DA FM 11-490-30

Title: *Electromagnetic Radiation Hazards*

Key Word(s): Radiation Hazards

Effective Date: 19 January 1989

Revision Level: Update 19 Jan 1989
Original 15 Oct 1981

Supersedence: This manual supersedes DA FM 11-490-30, dated 15 October 1981, and includes Changes 1 through 5.

Applicability: This manual applies to all elements of the US Army. As with AF TO 31-Z-10-4, it also applies to all elements of the Air Force.

Purpose: The purpose of this manual is to familiarize personnel involved in the operation and maintenance of communications-electronics equipment with the types of electromagnetic radiation hazards and the hazard control program, and to provide technical information and guidance for those personnel who are involved in the prediction and/or measurement of electromagnetic radiation hazards.

Comments: None

Document #: DA FM 24-2

Title: *Spectrum Management*

Key Word(s): Spectrum Management

Effective Date: 21 August 1991

Revision Level: Original

Supersedence: This manual supersedes FM 24-2, dated September 1987.

Applicability: This manual is a guide for US Army personnel engaged in spectrum management at all levels of command.

Purpose: The purpose of this document is to describe battlefield spectrum management responsibilities and functions from the international level down to the tactical battlefield level. The purpose is also to implement international standardized agreements that detail battlefield spectrum management.

Comments: None

Document #: DA MICOM TR RD-TE-87-1

Title: *Electromagnetic Environmental Criteria for US Army Missile Systems: EMC, EMR, EMI, EMP, ESD, and Lightning*

Key Word(s): Missile Systems

Effective Date: February 1987

Revision Level: Original Feb 1987

Supersedence: This report updates and supersedes Technical Report RT-85-14 published by the Army Missile Command in January 1985.

Applicability: The criteria provided in this report are applicable to the US Army Missile Command. The report has been approved for public release.

Purpose: The purpose of this report is to provide electromagnetic environmental criteria for US Army missile systems.

Comments: A revision of this report was initiated in 1992.

Document #: DA PAM 70-XXX (D) (E³)

Title: *Electromagnetic Environmental Effects (E³) and Survivability Programs*

Key Word(s): Survivability

Effective Date: When Approved.

Revision Level: NA

Supersedence: NA

Applicability: This document applies to all elements of the Army involved in E³ and Survivability Programs.

Purpose: The purpose of this document is to provide guidance for the proper relationship of E³ and Survivability Programs.

Comments: None

Document #: DA TB-MED 523

Title: *Control of Hazards to Health from Microwave and Radio Frequency Radiation and Ultrasound*

Key Word(s): Microwave Hazards

Effective Date: 15 July 1980

Revision Level: Original 15 Jul 1980

Supersedence: This bulletin supersedes TB-MED 270, dated 6 December 1965.

Applicability: This bulletin applies to US Army activities responsible for protection of personnel from exposure to potentially hazardous levels of microwave, RF, and ultrasound radiation.

Purpose: The purpose of this bulletin is to provide guidelines for the protection of personnel from exposure to potentially hazardous levels of microwave, RF, and ultrasound radiation.

Comments: None

Document #: DA TB-MED 524

Title: *Occupational and Environmental Health Control of Hazards from Laser Radiation*

Key Word(s): Laser Radiation, Radiation

Effective Date: 20 June 1985

Revision Level: Original 20 Jun 1985

Supersedence: This bulletin supersedes TB MED-279, dated 30 May 1975.

Applicability: This bulletin applies to laser activities established and operated at Active Army, US Army National Guard, US Army Reserve, and Corps of Engineers facilities.

Purpose: The purpose of this bulletin is to provide guidelines and establish responsibilities for personnel protection from laser radiations within the framework of currently documented experimental evidence.

Comments: None

Document #: DARCOM-P 706-235

Title: *Hardening Weapons Systems Against RF Energy*

Key Word(s): Hardening

Effective Date: February 1972

Revision Level: Original Feb 1972

Supersedence: NA

Applicability: This document applies to Army Weapons Systems Program Managers.

Purpose: The purpose of this document is to explain methods of hardening weapons systems against RF energy.

Comments: None

Document #: DARCOM-P 706-410

Title: *Engineering Design Handbook, Electromagnetic Compatibility*

Key Word(s): EMC Design

Effective Date: 1 March 1977

Revision Level: Original 01 Mar 1977

Supersedence: To some extent, this handbook can be considered to be an update of the *Interference Reduction Guide* prepared by the Filtron Co., Inc., in 1964 for the US Army Electronics Laboratory, Fort Monmouth, NJ.

Applicability: This handbook applies to the US Army Materiel Development and Readiness Command and to designers and developers of Army materiel.

Purpose: The purpose of this handbook is to take the wealth of information accumulated by the Army on the subject of EMC and make this information available to the designer.

Comments: This handbook contains information related to EMC that is useful to the entire EMC community.

4.4 US NAVY/MARINE CORPS INTERNAL EMC-RELATED DOCUMENTS

Summaries of EMC-related US Navy/Marine Corps handbooks, orders, instructions, procedures, and manuals are presented in this subsection.

Document #:	MC NDI HDBK
Title:	<i>Non-Developmental Item Handbook, United States Marine Corps</i>
Key Word(s):	Non-Developmental Item, NDI
Effective Date:	May 1989
Revision Level:	Original May 1989
Supersedence:	NA
Applicability:	This handbook applies to US Marine Corps activities that are responsible for procurement of non-developmental items (NDI).
Purpose:	The purpose of this handbook is to provide procedures for procurement of NDI for the US Marine Corps.
Comments:	None

Document #:	MCO 2400.2
Title:	<i>Marine Corps Management of the Radio Frequency Spectrum</i>
Key Word(s):	Spectrum Management
Effective Date:	16 June 1989
Revision Level:	Original 16 Jun 1989
Supersedence:	NA
Applicability:	This order applies to all USMC commands and activities involved in the research, development, procurement, or operation of communications-electronics (C-E) equipment that transmits or receives electromagnetic radiation.
Purpose:	The purpose of this order is to establish policy concerning use of the RF electromagnetic spectrum within the Marine Corps, to establish and assign responsibility for RF electromagnetic spectrum management within the Marine Corps, and to provide guidance and task assignments.
Comments:	None

Document #: MCO 2410.2A

Title: *Electromagnetic Environmental Effects Control Program*

Key Word(s): Electromagnetic Environmental Effects

Effective Date: 4 February 1991

Revision Level: Original 04 Feb 1991

Supersedence: This order cancels and supersedes MCO 2400.1 and MCO 2410.2.

Applicability: This order applies to US Marine Corps elements responsible for control of electromagnetic environmental effects that degrade performance of electronic and electrical systems that are in use or intended for use in the future.

Purpose: The purpose of this order is to publish information concerning the Marine Corps Electromagnetic Environmental Effects control program, to assign duties and responsibilities to accomplish the objectives of this program, and to publish instructions for use of the Marine Corps EMI hotline.

Comments: None

Document #: NAVAIRINST 2410.1D

Title: *Electromagnetic Environmental Effects (E³) Control Within the Naval Air Systems Command (NAVAIR)*

Key Word(s): Electromagnetic Environmental Effects

Effective Date: 17 May 1989

Revision Level: Rev D 17 May 1989
Rev C 04 Jun 1982

Supersedence: This instruction supersedes NAVAIRINST 2410.1C, dated 14 June 1982.

Applicability: This instruction applies to Naval Air Systems Command Headquarters, and all Naval Air System Command field activities that support NAVAIR projects involving planning, design, development, acquisition, lease, production, installation, modification, testing, operation, or maintenance of air systems.

Purpose: The purpose of this instruction is to implement requirements, publish policy and establish responsibilities to reduce adverse E³ problems in current air systems, eliminate E³ problems in new acquisitions, and ensure accreditation of facilities and certification of personnel responsible for application of state of the art EMC methods and techniques for air system applications.

Comments: None

Document #: NAVAIRINST 3430.2
Title: *Tactical Air Electronic Warfare Threat Emitter Listing Standardization Program*
Key Word(s): Electronic Warfare
Effective Date: 4 April 1984
Revision Level: Original 04 Apr 1984
Supersedence: NA
Applicability: This document is applicable to the Naval Air System Command.
Purpose: The purpose of this document is to standardize threat emitter listings for tactical air electronic warfare.
Comments: None

Document #: NAVAIRINST 8020.4B
Title: *Hazards of Electromagnetic Radiation to Ordnance Program*
Key Word(s): HERO
Effective Date: 13 March 1987
Revision Level: Rev B 13 Mar 1987
Supersedence: NA
Applicability: This instruction is applicable to those handling ordnance in the Naval Air System Command.
Purpose: The purpose of this instruction is to describe a program for the Naval Air Systems Command that will ensure safety from hazards to ordnance from electromagnetic radiation.
Comments: None

Document #: NAVFACINST 11012.113B

Title: *Electromagnetic Environmental Effects (E³) Program*

Key Word(s): Electromagnetic Environmental Effects

Effective Date: 16 December 1983

Revision Level: Rev B 16 Dec 1983

Supersedence: NA

Applicability: This instruction is applicable to the Naval Facilities Engineering Command (NAVFAC).

Purpose: The purpose of this instruction is to provide an EMC program for NAVFAC.

Comments: None

Document #: NAVSEAINST 2450.2

Title: *Electromagnetic Compatibility (EMC)*

Key Word(s): EMC

Effective Date: 24 February 1992

Revision Level: Original 24 Feb 1992

Supersedence: NA

Applicability: This instruction is applicable to the Naval Sea Systems Command (NAVSEA).

Purpose: The purpose of this instruction is to provide an EMC program for NAVSEA that is in accordance with OPNAVINST 2450.2.

Comments: None

Document #: NAVSEAINST 8020.7B

Title: *Hazards of Electromagnetic Radiation to Ordnance (HERO) Safety Program*

Key Word(s): HERO

Effective Date: 25 August 1987

Revision Level: Rev B 25 Aug 1987

Supersedence: NA

Applicability: This instruction is applicable to those handling ordnance in the Naval Sea Systems Command.

Purpose: The purpose of this instruction is to provide a safety program for NAVSEA to alleviate hazards of electromagnetic radiation to ordnance from electromagnetic radiation.

Comments: None

Document #: NAVSEA OP3565
NAVELEX 0967-LP-624-6010
NAVAIR 16-1-1529

Title: *Electromagnetic Radiation Hazards (U), Volume 1, Hazards to Personnel, Fuel (U), and other Flammable Material, Volume 2, Hazards to Ordnance (U)*

Key Word(s): HERF, HERP, HERO

Effective Date: 15 July 1989

Revision Level: Volume I, Sixth Revision Change 2, 15 Jul 1982
Volume II, Part 1, Sixth Revision, 15 Jul 1989
Volume II, Part 2, Sixth Revision, 15 Dec 1988

Supersedence: This document supersedes previous issues of OP3565.

Applicability: This document is applicable to all commands of the US Navy and Marine Corps.

Purpose: The purpose of this manual is to describe operating procedures and precautions to prevent injury to personnel, ignition of volatile vapors, and premature initiation of explosive devices in ordnance due to exposure to electromagnetic radiation.

Comments: Volume II, Part 2 of this document is classified CONFIDENTIAL.

Document #: NAVSO P-3656

Title: *Department of the Navy Handbook for Implementation of Non-Developmental Item (NDI) Acquisition*

Key Word(s): Non-Developmental Item, NDI

Effective Date: 6 June 1988

Revision Level: Original 6 Jun 1988

Supersedence: NA

Applicability: This document is applicable to all elements of the Department of the Navy involved in the acquisition of non-developmental items.

Purpose: The purpose of this handbook is to provide guidance for acquisition managers and functional personnel involved in NDI acquisitions.

Comments: None

Document #: NAVTELINST 2400.1

Title: *Management and Use of the Radio Frequency Spectrum Within the Department of the Navy (DON)*

Key Word(s): Spectrum Management

Effective Date: 19 October 1989

Revision Level: Original 19 Oct 1989

Supersedence: NA

Applicability: This instruction is applicable to all commands within the US Navy.

Purpose: The purpose of this instruction is to provide direction for management and use of the RF spectrum in the DON.

Comments: None

Document #: NTP 6(D)

Title: *Spectrum Management Manual*

Key Word(s): Spectrum Management

Effective Date: 31 August 1992

Revision Level: Rev D 31 Aug 1992

Supersedence: This document updates the information formerly contained in NTP 6(C).

Applicability: This manual was developed under the direction of the Commander, Naval Computer and Telecommunications Command and is promulgated for US Navy, Coast Guard and Marine Corps spectrum management activities.

Purpose: The purpose of this manual is to provide guidance and assistance to frequency management personnel in the conduct of their duties.

Comments: This manual should be useful for all military departments and other agencies performing spectrum management functions.

Document #: OPNAVINST 2400.20E

Title: *Navy Management of the Radio Frequency Spectrum*

Key Word(s): Spectrum Management

Effective Date: 19 January 1989

Revision Level: Rev E 19 Jan 1989

Supersedence: NA

Applicability: This instruction applies to all US Navy commands and activities both active and reserve, involved in the research, development, procurement, or operation of communications-electronics (C-E) equipment that transmit or receive electromagnetic radiation.

Purpose: The purpose of this instruction is to establish policy concerning the use of the electromagnetic spectrum within the US Navy, to define a management program, and to provide guidance to Navy commands and activities.

Comments: None

Document #: OPNAVINST 2400.25

Title: *National Emergency Readiness Plan for the Use of the Radio Spectrum*

Key Word(s): Emergency Readiness

Effective Date: 4 August 1983

Revision Level: Original 4 Aug 1983

Supersedence: NA

Applicability: This instruction is applicable to all commands of the US Navy and the US Marine Corps.

Purpose: The purpose of this instruction is to provide a readiness plan for the use of the radio spectrum in national emergencies.

Comments: None

Document #: OPNAVINST C2450.1

Title: *Department of the Navy (DON) Electromagnetic Compatibility (EMC) Management Program for SIGINT Sites (U)*

Key Word(s): SIGINT

Effective Date: 13 February 1989

Revision Level: Original 13 Feb 1989

Supersedence: NA

Applicability: This document is applicable to US Navy SIGINT sites.

Purpose: The purpose of this document is to provide an EMC management program for SIGINT sites.

Comments: None

Document #: OPNAVINST 2450.2

Title: *Electromagnetic Compatibility Program Within the Department of the Navy (DON)*

Key Word(s): EMC

Effective Date: 1 August 1990

Revision Level: Original 1 Aug 1990

Supersedence: This instruction cancels OPNAVINST 2410.31D, *EMC Program Within the Department of the Navy*, dated 6 August 1984.

Applicability: This instruction addresses Chief of Naval Operations (CNO), Commandant of the Marine Corps (CMC), Naval System Commands, and Fleet, Force, and Type Commander responsibilities to achieve EMC in all electrical and electronic equipment, subsystems, systems, platforms, and facilities developed, procured, operated, and maintained by the DON.

Purpose: The purpose of this instruction is to assign responsibilities for electromagnetic compatibility within the DON in accordance with the policy established by the Secretary of the Navy and with the reorganization of headquarters activities and to renumber the instructions following current Standard Subject Identification Codes.

Comments: None

Document #: OPNAVINST 3430.9C

Title: *Performing Electronic Countermeasures in the United States and Canada*

Key Word(s): ECM

Effective Date: 6 December 1978

Revision Level: Rev C 06 Dec 1978

Supersedence: NA

Applicability: This instruction is applicable to Navy and Marine forces performing electronic countermeasures in the US and Canada.

Purpose: The purpose of this instruction is to provide criteria for Navy/Marine Corps use of electronic countermeasures in the US and Canada.

Comments: None

Document #: OPNAVINST C3430.18D

Title: *Reporting, Meaconing, Intrusion, Jamming, and Interference of Electromagnetic Systems*

Key Word(s): Jamming

Effective Date: 31 July 1986

Revision Level: Rev D 31 Jul 1986
Original 03 Aug 1984

Supersedence: NA

Applicability: This instruction is applicable to Air Force, Army, Navy and Marine Corps command elements that operate equipment that radiates or receives electromagnetic energy throughout the frequency spectrum.

Purpose: The purpose of this regulation is to provide a standard format for reporting incidents of Meaconing, Intrusion, Jamming, and Interference to the Joint Electronic Warfare Center (JEWEC) for analysis and inclusion in a database of instances.

Comments: Common regulations for the other military departments are:

Army	AR105-3
Air Force	AFR 55-3
Marine Corps	MCO 3430.3C

Document #: OPNAVINST 3430.19

Title: *Electromagnetic Performance of Aircraft and Ships Systems (EMPASS), Procedures for Obtaining Services of*

Key Word(s): EMPASS

Effective Date: 15 March 1982

Revision Level: Original 15 Mar 1982

Supersedence: NA

Applicability: This instruction is applicable to Navy Commands having ship and aircraft systems that require services of the EMPASS.

Purpose: The purpose of this instruction is to provide procedures for obtaining services of the EMPASS.

Comments: None

Document #: OPNAVINST 5100.23C

Title: *Navy Occupational and Health (NAVOSH) Program Manual, Chapter 22, Radiation*

Key Word(s): NAVOSH

Effective Date: 2 November 1992

Revision Level: Rev C 02 Nov 1992
Rev B 31 Aug 1983
Original 28 Jul 1987

Supersedence: This instruction supersedes OPNAVINST 5100.23B, dated 31 August 1983.

Applicability: Chapter 22 was published 28 July 1987. Chapter 22 of this manual is applicable to all Navy activities possessing or utilizing sources of radiation which may affect the occupational safety or health of all Navy personnel, both civilian and military.

Purpose: The purpose of this chapter of the manual is to provide guidance for protection of Navy military and civilian personnel from radiation hazards.

Comments: None

Document #: OPNAVINST 9410.6

Title: *Naval Warfare Tactical Database (NWTDB) Requirements for Tactical Naval Warfare Systems*

Key Word(s): NWTDB

Effective Date: 14 July 1993

Revision Level: Original 14 Jul 1993

Supersedence: NA

Applicability: This instruction applies to Navy system developers, database producers, and operational users.

Purpose: The purpose of this instruction is to ensure that Tactical Naval Warfare Systems (TNWSs) use approved joint and Navy information standards.

Comments: As a result of this directive and in conformance with DoD directives, the Naval Warfare Tactical Data Base (NWTDB) Standards Manual has been developed. This manual contains the following two volumes:

Volume 1	Tactical Information Management
Volume 2	Data Element Dictionary.

This manual provides data administration procedures, data element standardization, and interoperability standards for C³I systems.

Document #: SECNAVINST 2410.1B

Title: *Electromagnetic Compatibility Program Within the Department of the Navy*

Key Word(s): EMC

Effective Date: 13 December 1972

Revision Level: Rev B 13 Dec 1972
Original 17 Oct 1967

Supersedence: NA

Applicability: This instruction is applicable to all commands of the US Navy and the US Marine Corps.

Purpose: The purpose of this instruction is to provide policy direction to all commands of the Navy and Marine Corps with respect to development of programs for electromagnetic compatibility in all electrical and electronic systems deployed by the Navy and Marine Corps.

Comments: None

Document #: SECNAVINST C3430.1A

Title: *Quick Reaction Capability (QRC) Policy for Electronic Warfare and Related Systems, Establishment of (U)*

Key Word(s): Quick Reaction Capability, QRC, Electronic Warfare

Effective Date: 11 December 1967

Revision Level: Rev A 11 Dec 1967

Supersedence: NA

Applicability: This document is applicable to Navy managers for procurement of electronic warfare and related systems.

Purpose: The purpose of this document is to provide accelerated procurement procedures for electronic warfare and related equipment.

Comments: None

Document #: SECNAVINST C3430.2

Title: *Department of the Navy Policy for Electronic Counter-Countermeasures (ECCM) in Electronic Systems (U)*

Key Word(s): ECCM

Effective Date: 17 January 1977

Revision Level: Original 17 Jan 1977

Supersedence: NA

Applicability: This instruction applies to all US Navy commands.

Purpose: The purpose of this instruction is to ensure that effective ECCM capabilities are included in electronic systems as required for the systems designated.

Comments: None

Document #: SECNAVINST 4210.6A

Title: *Acquisition Policy*

Key Word(s): Acquisition

Effective Date: 13 April 1988

Revision Level: Rev A 13 Apr 1988

Supersedence: NA

Applicability: This instruction is applicable to all elements of the Navy involved in acquisition of material.

Purpose: The purpose of this instruction is to provide policy guidance to elements of the Navy involved in acquisition of material.

Comments: None

Document #: SECNAVINST 4210.7A
Title: *Effective Acquisition of Navy Material*
Key Word(s): Acquisition
Effective Date: 16 January 1987
Revision Level: Rev A 16 Jan 1987
Supersedence: NA
Applicability: This instruction is applicable to all elements of the Navy involved in acquisition of material.
Purpose: The purpose of this instruction is to provide guidance for effective acquisition of Navy material.
Comments: None

Document #: SPAWARINST 5100.12A
Title: *Navy Laser Radiation Hazard Prevention Program*
Key Word(s): Laser Radiation, Radiation
Effective Date: 11 March 1987
Revision Level: Rev A 11 Mar 1987
Supersedence: NA
Applicability: This document is applicable to all Navy commands utilizing lasers.
Purpose: The purpose of this document is to provide a Navy program to prevent radiation hazards from lasers.
Comments: None

Document #: SPAWARINST 5101.1

Title: *Non-ionizing Electromagnetic Radiation (EMR) Hazard Control Within the Naval Electronics Systems Command*

Key Word(s): Radiation

Effective Date: 20 May 1982

Revision Level: Original 20 May 1982

Supersedence: NA

Applicability: This instruction applies to the Naval Electronics System Command, renamed the Space and Naval Warfare Systems Command (SPAWAR)

Purpose: The purpose of this instruction is to provide for control of non-ionizing EMR within SPAWAR.

Comments: None

SECTION 5

DEFENSE AGENCIES EMC-RELATED DOCUMENTS ON TELECOMMUNICATIONS SYSTEMS

5.1 INTRODUCTION

The documents listed in this section are military standards and military handbooks relating to telecommunications systems. These documents are of interest to those involved in analyzing and predicting the electromagnetic compatibility of telecommunications systems. System characteristics that are addressed include interoperability, performance, synchronization, timing, waveforms, hopping rate, data rate, protocol, frequency, spectrum usage, message format, and EMC. All proposed new standards or proposed revisions to existing standards listed in this section are forwarded to ECAC for review with respect to EMC issues. In some cases, these reviews result in changes being recommended by ECAC. In all cases, the documents being reviewed contain updated information on telecommunications systems that are currently deployed in DoD.

DISA MIL-STD-187 Series Telecommunications Planning Standards are listed in Table 5-1 and described in Section 5.2. DISA MIL-STD-188-100 Series Tactical/Long-Haul Telecommunications Standards are listed in Table 5-2 and described in Section 5.3. DISA MIL-STD-188-200 Series Tactical Telecommunications Standards are listed in Table 5-3 and described in Section 5.4. DISA MIL-STD-188-300 Series Long-Haul Telecommunications Standards are listed in Table 5-4 and described in Section 5.5. DISA Telecommunications Handbooks are listed in Table 5-5 and described in Section 5.6.

5.1.1 Preparation of Telecommunications Documents

The documents in this section are prepared under the direction of the Defense Information System Agency (DISA), formerly the Defense Communications Agency (DCA). The organization within DISA directly concerned with the development of the telecommunications documents is the

Joint Interoperability Engineering Organization (JIEO), formerly the Joint Tactical Command, Control and Communications Agency (JTC³A). The development of the individual documents is undertaken jointly with each of the military departments that are responsible for preparation of the documents assigned to them. Recent government directives with respect to development of new or revised standards, including telecommunications standards, require that, whenever possible, the developers of standards should utilize industry standards rather than develop new standards. For this reason, representatives of industry associations participate on the military standards committees. In some cases, this results in the state of the art of the technology being adopted as the standard.

5.1.2 Evolution of Telecommunications Standardization Documents

Documents listed in this section of the handbook span a period of more than 20 years with the earlier documents emphasizing manually operated voice and digital systems. With the arrival of an era in which communications and computer networks are combined, the systems served many functions beyond the original communications concept and became known as information systems. Thus, the DCA became the DISA and the term telecommunications was used in some cases rather than communications.

Originally, MIL-STD-188 covered technical standards for tactical and long-haul communications, but later evolved into a document applicable only to tactical communications (MIL-STD-188C). Standards for all military communications are now published in a MIL-STD-188 series of documents and are often referred to as telecommunications standards. The MIL-STD-188 series is subdivided into a MIL-STD-188-100 series covering common standards for tactical and long-haul communications, a MIL-STD-188-200 series covering standards for tactical communications, and a MIL-STD-188-300 series covering standards for long-haul communications. Emphasis is being placed on developing common standards for tactical and long-haul communications published in the MIL-STD-188-100 series and updating or cancelling older standards in the MIL-STD-188-300 series.

In conjunction with the development of the MIL-STD-188 series of documents, a series of handbooks has been developed. These handbooks provide technical guidance and reference sources for the design and implementation of tactical and long-haul telecommunications systems.

A MIL-STD-187 series of standards has been developed to provide technical planning standards for the telecommunications field. These standards are intended to document untested technology that supports a DoD requirement. After testing and validation, such technology may be addressed in the appropriate MIL-STD-188 series.

For the standards and handbooks included in this section, a listing of dates, revisions, notices or other changes is provided. Other information in this section listing includes applicability, purpose of the documents, and comments, if appropriate. This information is often useful because these documents are referenced in, and become part of, contractual documents. For long-term procurement, several revisions/notices to the same contract may be applicable.

Table 5-1. DISA MIL-STD-187 Series Telecommunications Planning Standards

MIL-STD-187-310	<i>Standards for Long Haul Communications Switching Planning Standards for the Defense Communications System</i>
MIL-STD-187-320	<i>Standards for Long Haul Communications Transmission Planning Standards for the Defense Communications Systems</i>
MIL-STD-187-700	<i>Interoperability and Performance Standards for the Defense Information System</i>
MIL-STD-187-711	<i>Asynchronous Transfer Mode/Asynchronous Optical Network ATM/SONET/Gigabit Networks</i>
MIL-STD-187-721A	<i>Planning and Guidance Standard for Automated Control Applique for HF Radio</i>
MIL-STD-187-722	<i>Interoperability and Performance Standard for Meteor Burst Communications (MBC)</i>

Table 5-2. DISA MIL-STD-188-100 Series Tactical/Long-Haul Telecommunications Standards

MIL-STD-188C	<i>Military Communication System Technical Standards</i>
MIL-STD-188-100	<i>Common Long Haul and Tactical Communications System Technical Standards</i>
MIL-STD-188-101	<i>Military Communication System Technical Standards Common Long Haul (DCS) Tactical Reference Circuit Standard</i>
MIL-STD-188-105	<i>All Digital Tactical to Wide Area Gateway</i>
MIL-STD-188-110A	<i>Interoperability and Performance Standards for Data Modems</i>
MIL-STD-188-111A	<i>Interoperability and Performance Standards for Fiber Optic Communications Systems</i>
MIL-STD-188-112	<i>Subsystem Design and Engineering Standards for Common Long Haul/Tactical Cable and Wire Communications</i>
MIL-STD-188-113	<i>Interoperability and Performance Standards for Analog-to-Digital Conversion Techniques</i>
MIL-STD-188-114A	<i>Electrical Characteristics of Digital Interface Circuits</i>
MIL-STD-188-115	<i>Interoperability and Performance Standards for Communications Timing and Synchronization Subsystems</i>
MIL-STD-188-116-2	<i>Interoperability Standards for Information and Record Traffic Exchange Mode II</i>
MIL-STD-188-116-4	<i>Interoperability Standard for Information and Record Traffic Exchange Mode VI</i>
MIL-STD-188-120	<i>Military Communication System Standards Terms and Definitions</i>
MIL-STD-188-124B	<i>Grounding, Bonding and Shielding for Common Long Haul/Tactical Communication Systems Including Ground Based Communications-Electronics Facilities and Equipments</i>
MIL-STD-188-125	<i>High Altitude Electromagnetic Pulse (HEMP) Protection for Ground-Based C³I Facilities Performing Critical Time-Urgent Missions for Common Long-Haul/Tactical Communications Systems</i>
MIL-STD-188-131	<i>Interoperability and Performance Standard for Video Teleconferencing</i>
MIL-STD-188-132	<i>Interoperability and Performance Standard for Audiographic Conferencing</i>
MIL-STD-188-135	<i>Meteor Burst Interoperability Standard, Initial Capability</i>
MIL-STD-188-136	<i>EHF Medium Data Rate (MDR) Satellite Data Link Standards (SDLS): Uplinks and Downlinks</i>
MIL-STD-188-140A	<i>Equipment Technical Design Standards for Common Long Haul/Tactical Radio Communications in the Low Frequency Band and Lower Frequency Bands</i>
MIL-STD-188-141A	<i>Interoperability and Performance Standards for Medium and High Frequency Radio Equipment</i>
MIL-STD-188-144	<i>Subsystem Design and Engineering Standards for Common Long Haul/Tactical Tropospheric Scatter Radio Communications</i>
MIL-STD-188-145	<i>Interoperability and Performance Standards for Digital LOS Microwave Radio Equipment</i>
MIL-STD-188-146	<i>Interoperability and Performance Standards for Satellite Communications</i>
MIL-STD-188-147	<i>Interoperability and Performance Standards for EHF Satellite Communications</i>
MIL-STD-188-148-1	<i>Common Advanced HFAJ Waveform (U)</i>
MIL-STD-188-148A	<i>HF AJ Waveform (U)</i>
MIL-STD-188-148B	<i>Common Advanced HF AJ Waveform (U)</i>
MIL-STD-188-154	<i>Subsystem, Equipment, and Interface Standards for Common Long Haul and Tactical Technical Control Facilities</i>
MIL-STD-188-157	<i>Interoperability and Performance Standard for LANS</i>
MIL-STD-188-160	<i>Terminal Subsystems</i>
MIL-STD-188-161C	<i>Interoperability and Performance Standards for Digital Facsimile Equipment</i>
MIL-STD-188-163	<i>Digital Entry Device Interoperability Standards</i>
MIL-STD-188-171	<i>Interoperability Standards for Information and Record Traffic Exchange Mode I</i>
MIL-STD-188-172	<i>Interoperability Standards for Information and Record Traffic Exchange Mode II</i>
MIL-STD-188-173	<i>Interoperability Standards for Information and Record Traffic Exchange Mode V</i>
MIL-STD-188-174	<i>Interoperability Standards for Information and Traffic Exchange Mode VI</i>
MIL-STD-188-175	<i>Interoperability Standards for Information and Record Traffic Exchange (Mode VII)</i>
MIL-STD-188-181	<i>Interoperability Standard for Dedicated 5 kHz and 25 kHz UHF Satellite Communications Channels</i>
MIL-STD-188-182	<i>Interoperability Standard for 5 kHz UHF DAMA Terminal Waveform</i>
MIL-STD-188-183	<i>Interoperability Standard for 25-kHz UHF TDMA/DAMA Terminal Waveform</i>

Table 5-2. DISA MIL-STD-188-100 Series Tactical/Long-Haul Telecommunications Standards - Continued

MIL-STD-188-184	<i>Data Control Waveform, Interoperability and Performance Standard for</i>
MIL-STD-188-185	<i>UHF Satellite Communications Demand Assigned Multiple Access (DAMA) Controllers Standards</i>
MIL-STD-188-190	<i>Methods for Communications Systems Measurements</i>
MIL-STD-188-194	<i>Integrated Services Digital Network Profile (ISDNP)</i>
MIL-STD-188-196	<i>Bi-Level Image Compression for the National Imagery Transmission Format Standard (NITFS)</i>
MIL-STD-188-197	<i>Adaptive Recursive Interpolated Differential Pulse Code Modulated (ARIDPCM) Compression Algorithm for the National Imagery Transmission Format Standard (NITFS)</i>
MIL-STD-188-198	<i>Joint Photographic Experts Group (JPEG) Image Compression for the National Imagery Transmission Format Standard (NITSF)</i>

Table 5-3. DISA MIL-STD-188-200 Series Tactical Telecommunications Standards

MIL-STD-188-200	<i>System Design and Engineering Standards for Tactical Communications</i>
MIL-STD-188-202	<i>Interoperability and Performance Standards for Tactical Digital Transmission Groups (Coaxial Cables)</i>
MIL-STD-188-203-1A	<i>Interoperability and Performance Standards for Tactical Digital Information Link (TADIL) A</i>
MIL-STD-188-203-2	<i>Subsystem Design and Engineering Standards for Tactical Digital Information Link (TADIL) B</i>
MIL-STD-188-203-3	<i>Subsystem Design and Engineering Standards for Tactical Digital Information Link (TADIL) C</i>
MIL-STD-188-203-4	<i>Interoperability and Performance Standards for Tactical Digital Information Link (TADIL) J</i>
MIL-STD-188-212	<i>Subsystem Design and Engineering Standards for Tactical Digital Information Link (TADIL) B</i>
MIL-STD-188-216A	<i>Interoperability Standards for Data Adapter Control Mode</i>
MIL-STD-188-220	<i>Digital Message Transfer Device Subsystems, Interoperability Standard for</i>
MIL-STD-188-242	<i>Interoperability and Performance Standards for Tactical Single Channel Very High Frequency (VHF) Radio Equipment</i>
MIL-STD-188-243	<i>Interoperability and Performance Standards for Tactical Single Channel Ultra High Frequency (UHF) Radio Communications</i>
MIL-STD-188-244	<i>Interoperability and Performance Standards for UHF Frequency Hopping Tactical Radio System</i>
MIL-STD-188-256A	<i>Interoperability and Performance Standards for Digital Signalling and Supervision of Tactical Communications</i>
MIL-STD-188-260	<i>Design and Engineering Standards for Tactical Terminal Subsystems</i>
MIL-STD-188-283	<i>Interoperability and Interface Standard for Tactical Fiber Optic Communications</i>

Table 5-4. DISA MIL-STD-188-300 Series Long-Haul Telecommunications Standards

MIL-STD-188-300	<i>Standards for Long Haul Communications System Design Standards Applicable to the Defense Communications System</i>
MIL-STD-188-310A	<i>Subsystem Design and Engineering Standards for Technical Control Facilities</i>
MIL-STD-188-311	<i>Technical Design Standards for Frequency Division Multiplexers</i>
MIL-STD-188-313	<i>Subsystem Design and Engineering Standards and Equipment, Technical Design Standards for Long Haul Communications Transversing Microwave LOS Radio and Tropospheric Scatter Radio</i>
MIL-STD-188-315	<i>Subsystem Design and Engineering and Equipment, Technical Design Standards for Wire Systems</i>
MIL-STD-188-317	<i>System Design and Engineering Standards and Equipment, Technical Design Standards for High Frequency Radio</i>
MIL-STD-188-318	<i>System and Subsystem Design and Engineering and Equipment, Technical Standards for Closed Circuit Television (CCTV) Systems</i>
MIL-STD-188-322	<i>Subsystem Design/Engineering and Equipment Technical Design Standards For Long-Haul Line of Sight (LOS) Digital Microwave Radio Transmission</i>
MIL-STD-188-323	<i>DCS Digital Transmission Performance Standard</i>
MIL-STD-188-331	<i>Interoperability and Performance Standard for Video Teleconferencing</i>
MIL-STD-188-340	<i>Equipment Technical Design Standards for Voice Order-Wire Multiplex</i>
MIL-STD-188-341	<i>Non-Diversity Digital Data Modems (2400 bps)</i>
MIL-STD-188-342	<i>Equipment Technical Design Standards for Voice Frequency Carrier Telegraph (FSK)</i>
MIL-STD-188-344	<i>Non-Diversity Digital Data Modem, 1200 Bits Per Second</i>
MIL-STD-188-346	<i>Equipment Technical Design Standards for Analog End Instruments and Central Office Ancillary Devices</i>
MIL-STD-188-347	<i>Equipment Technical Design Standards for Digital End Instruments and Ancillary Devices</i>
MIL-STD-188-348	<i>Telecommunications: Interoperability Requirements for Trunked Land Mobile Radio (LMR) System Signalling Operating With Analog and 25 kHz Channel Digital Radios</i>
MIL-STD-188-350	<i>Long Haul Digital Circuit Switching</i>

Table 5-5. DISA MIL-HDBK Series Telecommunications Handbooks

MIL-HDBK-188	<i>Guide for Developers and Users of Communications Systems in the MIL-STD-188 Series, Volumes I, II & III</i>
MIL-HDBK-232A	<i>Red/Black Engineering Installation Guidelines</i>
MIL-HDBK-411B	<i>Power and Environment for Sensitive DoD Electronic Equipment, Volumes I, II and III</i>
MIL-HDBK-412	<i>Site Survey and Facility Design Handbook for Satellite Earth Stations</i>
MIL-HDBK-413	<i>Design Handbook for High Frequency Radio Communications Systems</i>
MIL-HDBK-414	<i>Technical Control Facilities and Equipment for Long Haul Communications, Volumes I and II</i>
MIL-HDBK-415	<i>Design Handbook for Optic Communications</i>
MIL-HDBK-416	<i>Facility Design Handbook for Line-of-Sight (LOS) Microwave Communications</i>
MIL-HDBK-417	<i>Facility Design Handbook for Tropospheric Scatter</i>
MIL-HDBK-418	<i>Design and Installation Guide for Digital Interface Circuits</i>
MIL-HDBK-419A	<i>Grounding, Bonding and Shielding for Electronic Equipment and Facilities, Volumes I and II</i>
MIL-HDBK-420	<i>Site Survey Handbook for Communications Facilities</i>
MIL-HDBK-421	<i>Communications Timing and Synchronization Subsystems</i>
MIL-HDBK-423	<i>High-Altitude Electromagnetic Pulse (HEMP) Protection for Fixed and Transportable Ground-Based Facilities - Volume I Fixed Facilities, Volume II Transportable Facilities</i>

5.2 DISA MIL-STD-187 SERIES TELECOMMUNICATIONS PLANNING STANDARDS

Summaries of DISA telecommunications planning standards are presented in this subsection.

Document #:	MIL-STD-187-310
Title:	<i>Standards for Long Haul Communications Switching Planning Standards for the Defense Communications System</i>
Key Word(s):	Long Haul, DCS
Effective Date:	14 October 1976
Revision Level:	Original 14 Oct 1976
Supersedence:	NA
Applicability:	This planning standard is approved for use by all departments and agencies of the DoD.
Purpose:	The purpose of this standard is to establish a reference source of unified system design guidance for the evolving Defense Communications System (DCS). This guidance is intended to help assure the compatibility of future DCS subsystems, as well as the interoperability of the DCS with other DoD and non-DoD communications systems.
Comments:	The area/supply code for this document is AREA SLHC.

Document #:	MIL-STD-187-320
Title:	<i>Standards for Long Haul Communications Transmission Planning Standards for the Defense Communications Systems</i>
Key Word(s):	Long Haul, DCS
Effective Date:	29 March 1980
Revision Level:	Original 29 Mar 1980
Supersedence:	NA
Applicability:	This planning standard is approved for use by all departments and agencies of DoD.
Purpose:	The purpose of this standard is to establish a reference source of unified system design guidance for the evolving Defense Communications System (DCS). This guidance is intended to help assure the compatibility of future DCS subsystems, as well as the interoperability of the DCS with other DoD and non-DoD communications systems.
Comments:	The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-187-700

Title: *Interoperability and Performance Standards for the Defense Information System*

Key Word(s): Defense Information System

Effective Date: 1 June 1992

Revision Level: Original 01 Jun 1992

Supersedence: This planning standard will eventually be incorporated into the MIL-STD-188 series of standards.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to define interoperability and performance for the Defense Information System.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-187-711

Title: *Asynchronous Transfer Mode/Asynchronous Optical Network ATM/SONET/Gigabit Networks*

Key Word(s): ATM, SONET, Networks

Effective Date: When Approved

Revision Level: Original

Supersedence: NA

Applicability: When completed, this standard will become a planning standard to assess DoD use of high-speed network technologies.

Purpose: The purpose of this standard is to determine the need for development of a new DoD MIL-STD-188 standard or series of standards for broadband network interoperability.

Comments: The project was approved in December 1992. The area/supply code for this document is AREA TCSS.

Document #: MIL-STD-187-721A

Title: *Planning and Guidance Standard for Automated Control Applique for HF Radio*

Key Word(s): Automated Control Applique, Applique

Effective Date: 22 October 1993

Revision Level: Rev A 22 Oct 1993
Original 18 Feb 1993

Supersedence: This planning standard is being developed in several segments. The basic standard has been completed and approved. Four segments of the standard are in various stages of development. When the entire package is validated and approved, it will be consolidated into MIL-STD-188-141, *Interoperability and Performance Standards for Medium and High Frequency Radio Equipment*.

Applicability: This standard is approved for use in all departments and agencies of DoD.

Purpose: The purpose of this standard is to describe technical parameters for adaptive high-frequency (HF) systems that are more advanced than those described in MIL-STD-188-141. The remaining segments are:

- a. Polling and Connectivity
- b. Advanced Link Quality Assessment
- c. Relaying
- d. Network Management.

Comments: These segments are being integrated into MIL-STD-188-141 as they are completed. The area/supply code for this document is AREA TCSS.

Document #: MIL-STD-187-722

Title: *Interoperability and Performance Standard for Meteor Burst Communications (MBC)*

Key Word(s): Meteor Burst Communications, MBC

Effective Date: When Approved

Revision Level: Coordination Draft 2nd Qtr 1992

Supersedence: NA

Applicability: NA

Purpose: The purpose of this planning standard is to identify military interoperability requirements for later input to the federal standards for MBC systems.

Comments: This planning standard is being developed in coordination with proposed federal standards 1055, 1056 and 1057 that will define connectivity between remote and master stations and stations in MBC networks. Proposed Federal Standard 1056 will provide encryption for the MBC systems. The area/supply code for this document is AREA SLHC.

5.3 DISA MIL-STD-188-100 SERIES TACTICAL/LONG-HAUL TELECOMMUNICATIONS STANDARDS

Summaries of DISA tactical/long-haul telecommunications standards are presented in this subsection.

Document #: MIL-STD-188C

Title: *Military Communication System Technical Standards*

Key Word(s): Military Communication System

Effective Date: 19 June 1989

Revision Level: Cancelled by Notice 3
 Rev C Notice 3 19 Jun 1989
 Rev C Notice 2 17 Nov 1976
 Rev C Notice 1 01 Jun 1976
 Rev C 24 Nov 1969
 Rev B 24 Feb 1964
 Rev A 25 Apr 1958
 Original 13 Jul 1958

Supersedence: MIL-STD-188C was superseded by MIL-STD-188-100 and MIL-STD-188-200.

Applicability: NA

Purpose: The purpose of this standard is to provide technical design standards for military communications systems.

Comments: Although this standard has been cancelled by Notice 3, many equipments built in accordance with the requirements of MIL-STD-188C are still in use by the military departments. The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-100

Title: *Common Long Haul and Tactical Communications System Technical Standards*

Key Word(s): Long Haul, Tactical Communications System

Effective Date: 17 November 1976

Revision Level: Notice 3 17 Nov 1976
 Notice 2 01 Jun 1976
 Notice 1 16 Jul 1975
 Original 15 Nov 1972

Supersedence: MIL-STD-188-100 supersedes MIL-STD-188-101, dated 11 June 1971. Appendix F of MIL-STD-188-100 was cancelled by Notice 3 and was superseded by MIL-STD-188-120, *Terms and Definitions*. MIL-STD-188-120 has been superseded by Federal Standard 1037, *Glossary of Telecommunications Terms*.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to provide common standards for long-haul and tactical communications systems.

Comments: The area/supply code for this document is AREA SLHC/TCTS.

Document #: MIL-STD-188-101

Title: *Military Communication System Technical Standards Common Long Haul (DCS) Tactical Reference Circuit Standard*

Key Word(s): Long Haul

Effective Date: 11 June 1971

Revision Level: Original 11 Jun 1971

Supersedence: This standard has been superseded by MIL-STD-188-100, dated 17 November 1976.

Applicability: NA

Purpose: The purpose of this standard is to specify military communications system technical standards and common long-haul tactical reference circuit standards.

Comments: The area/supply code for this document is AREA MISC.

Document #: MIL-STD-188-105

Title: *All Digital Tactical to Wide Area Gateway*

Key Word(s): Tactical to Wide Area Gateway

Effective Date: When Approved

Revision Level: Coordination draft 1st Qtr 1994

Supersedence: NA

Applicability: This standard will be mandatory for use by all DoD, if approved.

Purpose: The purpose of this standard is to define requirements for a tactical to wide area gateway for the Integrated Services Digital Network (ISDN). It will include Secure Terminal Equipment (STE) features.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-110A

Title: *Interoperability and Performance Standards for Data Modems*

Key Word(s): Modems

Effective Date: 30 September 1991

Revision Level:

Rev A	30 Sep 1991
Notice 2	04 Nov 1988
Notice 1	15 Nov 1983
Original	15 Nov 1980

Supersedence: This standard supersedes MIL-STD-188-110, Notice 2, dated 4 November 1988, which superseded MIL-STD-188-344.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to establish technical standards and design objectives that are necessary to ensure interoperability and to promote compatibility among data modems used in long-haul and tactical communications systems.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-111A

Title: *Interoperability and Performance Standards for Fiber Optic Communications Systems*

Key Word(s): Fiber Optics

Effective Date: 14 December 1988

Revision Level:

Rev A	14 Dec 1988
Original	24 Jan 1984

Supersedence: This standard supersedes MIL-STD-188-111, dated 24 January 1984.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to provide interoperability and performance standards for fiber optic communications systems.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-112

Title: *Subsystem Design and Engineering Standards for Common Long Haul/Tactical Cable and Wire Communications*

Key Word(s): Long Haul

Effective Date: 31 August 1983

Revision Level: Original 31 Aug 1983

Supersedence: NA

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to specify subsystem design and engineering standards for common long-haul/tactical cable and wire communications.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-113

Title: *Interoperability and Performance Standards for Analog-to-Digital Conversion Techniques*

Key Word(s): Analog-to-Digital Conversion, A/D Conversion

Effective Date: 17 February 1987

Revision Level: Original 17 Feb 1987

Supersedence: NA

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to establish interoperability and performance standards for analog-to-digital conversion techniques to be used over both long-haul (nontactical) and tactical communications systems.

Comments: The area/supply code for this document is AREA SLHC/TCTS.

Document #: MIL-STD-188-114A

Title: *Electrical Characteristics of Digital Interface Circuits*

Key Word(s): Digital Interface Circuits

Effective Date: 13 December 1991

Revision Level: Rev A Notice 1 13 Dec 1991
Rev A 30 Sep 1985
Original 24 Mar 1976

Supersedence: Revision A Notice 1 of this standard supersedes MIL-STD-188-114, dated 24 March 1976, which superseded subparagraph 4.3.1.3 of MIL-STD-188-100 and subparagraph 7.2.1 of MIL-STD-188C.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to specify the electrical characteristics of the unbalanced voltage and the balanced voltage digital interface circuits normally implemented in integrated circuit technology.

Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-115

Title: *Interoperability and Performance Standards for Communications Timing and Synchronization Subsystems*

Key Word(s): Communications Timing and Synchronization Subsystems

Effective Date: 31 March 1986

Revision Level: Original 31 Mar 1986

Supersedence: NA

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to provide a standardized method of timing that will fully support DoD communications timing requirements during peace and war, as well as support new communications functions as the need arises.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-116-2

Title: *Interoperability Standards for Information and Record Traffic Exchange Mode II*

Key Word(s): Information and Record Traffic Exchange Mode II

Effective Date: 12 February 1988

Revision Level: Original 12 Feb 1988

Supersedence: This standard is replaced by MIL-STD-188-172, *Interoperability Standards for Information and Record Traffic Exchange Mode II*.

Applicability: This standard is mandatory for use within DoD.

Purpose: The purpose of this standard is to ensure interoperability and to promote commonality of communications equipment using the Mode II channel coordination procedure.

Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-116-4

Title: *Interoperability Standard for Information and Record Traffic Exchange Mode VI*

Key Word(s): Information and Record Traffic Exchange Mode VI

Effective Date: 14 June 1990

Revision Level: Cancelled by Notice 1
 Notice 1 14 Jun 1990
 Original 09 Mar 1987

Supersedence: This standard is superseded by MIL-STD-188-174, *Interoperability Standards for Information and Record Traffic Exchange Mode VI*.

Applicability: NA

Purpose: The purpose of this standard is to ensure interoperability and to promote commonality of communications equipment and subsystems using Mode VI channel coordination procedures.

Comments: This standard is cancelled by Notice 1, dated 14 June 1990. The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-120

Title: *Military Communication System Standards Terms and Definitions*

Key Word(s): Military Communication System

Effective Date: 14 March 1983

Revision Level: Cancelled by Notice 1
Notice 1 14 Mar 1983
Original 15 May 1976

Supersedence: This standard is superseded by Federal Standard FED-STD-1037, *Glossary of Telecommunications Terms*.

Applicability: NA

Purpose: The purpose of this standard is to provide standard military telecommunications terms and definitions.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-124B

Title: *Grounding, Bonding and Shielding for Common Long Haul/Tactical Communication Systems Including Ground Based Communications-Electronics Facilities and Equipments*

Key Word(s): Grounding, Bonding and Shielding

Effective Date: 1 February 1992

Revision Level: Rev B 01 Feb 1992
Rev A 02 Feb 1984
Original 14 Jun 1978

Supersedence: MIL-STD-124B supersedes MIL-STD-124A.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to establish the minimum basic requirements and goals for grounding, bonding, and shielding of ground-based telecommunications C-E equipment, installations, subsystems, and facilities including buildings and structures supporting tactical and long-haul communications systems.

Comments: The area/supply code for this document is AREA SLHC/TCTS/EMCS.

Document #: MIL-STD-188-125

Title: *High Altitude Electromagnetic Pulse (HEMP) Protection for Ground-Based C^I Facilities Performing Critical Time-Urgent Missions for Common Long-Haul/Tactical Communications Systems*

Key Word(s): HEMP Protection

Effective Date: 26 June 1990

Revision Level: Original 26 Jun 1990

Supersedence: NA

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to establish minimum performance requirements for low-risk protection from mission-aborting damage or upset due to HEMP threat environments of DoD-STD-2169. This standard also addresses minimum testing requirements for demonstrating that prescribed performance has been achieved.

Comments: This standard is being updated as MIL-STD-188-125A in two volumes. Volume I will cover fixed facilities and Volume II will cover transportable facilities. The updated volumes are being assigned in area (TCSS), Telecommunications Systems Standards. Draft of 19 July 1993 is available. The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-131

Title: *Interoperability and Performance Standard for Video Teleconferencing*

Key Word(s): Video Teleconferencing

Effective Date: When Approved

Revision Level: Coordination Draft 2nd Qtr 1994

Supersedence: NA

Applicability: This standard is expected to be applicable to all DoD.

Purpose: The purpose of this standard is to describe requirements for interoperability and performance for video teleconferencing.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-132

Title: *Interoperability and Performance Standard for Audiographic Conferencing*

Key Word(s): Audiographic Conferencing

Effective Date: When Approved

Revision Level: Coordination Draft 3rd Qtr 1990

Supersedence: NA

Applicability: This standard is expected to be applicable to all DoD when completed and approved.

Purpose: The purpose of this standard is to provide interoperability and performance requirements for Audiographic Conferencing.

Comments: Project has been on hold because of staffing considerations. The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-135

Title: *Meteor Burst Interoperability Standard, Initial Capability*

Key Word(s): Meteor Burst

Effective Date: NA

Revision Level: Coordination Draft 1st Qtr 1988

Supersedence: This standard was never approved. It was changed to a 187-series planning standard, MIL-STD-187-722.

Applicability: NA

Purpose: The purpose of this standard is to provide an initial capability for interoperability in meteor burst communications.

Comments: Standards developed and used by industry will be approved for military meteor burst communications. Federal standards for interoperability are being developed by the Federal Telecommunications Standards Institute. These standards will define connectivity and encryption and are being proposed as Federal Standards 1055, 1056 and 1057. The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-136

Title: *EHF Medium Data Rate (MDR) Satellite Data Link Standards (SDLS): Uplinks and Downlinks (U)*

Key Word(s): EHF Medium Data Rate

Effective Date: When Approved

Revision Level: Final Coordination Draft 30 Jun 1993

Supersedence: NA

Applicability: This standard will be mandatory for use by all departments and agencies of DoD after final approval.

Purpose: The purpose of this standard is to define EHF medium data rate satellite data link standards for uplinks and downlinks.

Comments: This standard is currently in final review. The area/supply code for this document is AREA TCSS.

Document #: MIL-STD-188-140A

Title: *Equipment Technical Design Standards for Common Long Haul/Tactical Radio Communications in the Low Frequency Band and Lower Frequency Bands*

Key Word(s): Long Haul

Effective Date: 1 May 1990

Revision Level: Rev A 01 May 1990
Original 03 Apr 1981

Supersedence: MIL-STD-188-140A supersedes MIL-STD-188-140.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to establish minimum performance requirements in the form of technical design standards and design objectives that will ensure interoperability of future radio subsystems equipment in the VLF and LF bands.

Comments: The area/supply code for this document is AREA TCTS/SLHC.

Document #: MIL-STD-188-141A

Title: *Interoperability and Performance Standards for Medium and High Frequency Radio Equipment*

Key Word(s): Medium and High Frequency Radios

Effective Date: 10 September 1993

Revision Level:

Rev A Notice 2	10 Sep 1993
Rev A Notice 1	17 Jun 1992
Rev A	15 Sep 1988
Original	26 Mar 1986

Supersedence: Change Notice 2, MIL-STD-188-141A, replaces all applicable portions of MIL-STD-188-141A, dated 15 September 1988, along with Change Notice 1, dated 17 June 1992.

Applicability: This standard is mandatory within DoD in the design and development of new MF and HF radio equipment. The criteria provided shall also be applied to procurement of nondevelopmental items.

Purpose: The purpose of this standard is to establish technical parameters, in the form of mandatory standards and optional design objectives, that are considered necessary to ensure interoperability of new long-haul and tactical radio equipment in the medium-frequency band and in the high-frequency band.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-144

Title: *Subsystem Design and Engineering Standards for Common Long Haul/Tactical Tropospheric Scatter Radio Communications*

Key Word(s): Tropospheric Scatter Radios

Effective Date: NA

Revision Level: NA

Supersedence: NA

Applicability: NA

Purpose: NA

Comments: This project has been inactive since the 60th JTSSG Meeting. A new project SLHC-4220 was initiated at that meeting. The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-145

Title: *Interoperability and Performance Standards for Digital LOS Microwave Radio Equipment*

Key Word(s): Digital LOS Microwave Radios

Effective Date: 28 July 1992

Revision Level: Notice 1 28 Jul 1992
Original 07 May 1987

Supersedence: Supersedes MIL-STD-188-322, *Subsystem Design/Engineering and Equipment Technical Design Standards for Long-Haul Line of Sight (LOS) Digital Microwave Radio Transmission* Notice 2 dated 29 July 1988.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to set forth mandatory interoperability and performance standards, as well as design objectives, for new long-haul and tactical line-of-sight microwave radio equipment.

Comments: The area/supply code for this document is AREA TCSS.

Document #: MIL-STD-188-146

Title: *Interoperability and Performance Standards for Satellite Communications*

Key Word(s): Satellite Communications

Effective Date: 15 June 1988

Revision Level: Original 15 Jun 1988

Supersedence: NA

Applicability: This standard is mandatory for use by all departments and agencies within DoD and applies to the design and development of long-haul and tactical Satellite Communications (SATCOM) systems.

Purpose: The purpose of this standard is to set forth technical and engineering parameters to ensure interoperability and promote compatibility and commonality among SATCOM systems. It establishes a level of performance for SATCOM systems that will satisfy the requirements of a majority of users.

Comments: The technical parameters set forth by this standard represent general minimum interoperability and performance characteristics. The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-147

Title: *Interoperability and Performance Standards for EHF Satellite Communications*

Key Word(s): EHF Satellite Communications

Effective Date: NA

Revision Level: Cancelled February 1992

Supersedence: NA

Applicability: NA

Purpose: The purpose of this standard is to specify interoperability and performance standards for EHF satellite communications.

Comments: The project was cancelled due to lack of funding at JTSSG Meeting February 1992. The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-148-1

Title: *Common Advanced HFAJ Waveform (U)*

Key Word(s): HFAJ Waveform

Effective Date: NA

Revision Level: Cancelled January 1989

Supersedence: This standard is superseded by MIL-STD-188-148A.

Applicability: NA

Purpose: The purpose of this standard is to specify the common advanced HFAJ waveform.

Comments: The project was cancelled at the 65th JTSSC Meeting in January 1989. The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-148A
Title: *HF AJ Waveform (U)*
Key Word(s): HF AJ Waveform
Effective Date: 13 April 1992
Revision Level: Original
Supersedence: This standard supersedes MIL-STD-188-148-1.
Applicability: This standard is approved for DoD use.
Purpose: The purpose of this standard is to specify the HF AJ Waveform.
Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-148B
Title: *Common Advanced HF AJ Waveform (U)*
Key Word(s): HF AJ Waveform
Effective Date: NA
Revision Level: Cancelled July 1991
Supersedence: For the present, refer to MIL-STD-188-148A for information on this project.
Applicability: NA
Purpose: The purpose of this standard is to specify the common advanced HFAJ waveform.
Comments: The project was cancelled at the 75th JTSSG Meeting in July 1991. The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-154

Title: *Subsystem, Equipment, and Interface Standards for Common Long Haul and Tactical Technical Control Facilities*

Key Word(s): Long Haul

Effective Date: 22 May 1987

Revision Level: Original 22 May 1987

Supersedence: This standard supersedes MIL-STD-188-310A.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to establish design and engineering criteria for long-haul and tactical technical control facilities and associated patch and test facilities in DoD.

Comments: None

Document #: MIL-STD-188-157

Title: *Interoperability and Performance Standard for LANS*

Key Word(s): LANS, Networks

Effective Date: May 1976

Revision Level: Cancelled by Notice 1
Notice 1 Mar 1983
Original May 1976

Supersedence: NA

Applicability: NA

Purpose: The purpose of this standard is to specify interoperability and performance standards for LANS.

Comments: This standard was cancelled by Notice 1, dated March 1983. The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-160

Title: *Terminal Subsystems*

Key Word(s): Terminal Subsystems

Effective Date: NA

Revision Level: Cancelled October 1990

Supersedence: NA

Applicability: NA

Purpose: NA

Comments: This project was cancelled at the 72nd JTSSG meeting in October 1990. The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-161C

Title: *Interoperability and Performance Standards for Digital Facsimile Equipment*

Key Word(s): Digital Facsimile Equipment

Effective Date: 30 October 1991

Revision Level: Rev C 30 Oct 1991
 Rev B 30 Mar 1990
 Rev A Notice 1 17 Mar 1989
 Rev A 04 Jul 1988
 Original 30 Jan 1981

Supersedence: MIL-STD-188-160C supersedes revision B, dated 30 March 1990.

Applicability: The standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to establish, in the most economical manner, interoperability and performance parameters necessary to ensure interoperability among long-haul and tactical digital facsimile equipment.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-163

Title: *Digital Entry Device Interoperability Standards*

Key Word(s): Digital Entry Devices

Effective Date: NA

Revision Level: Project was cancelled.

Supersedence: This project was renamed and superseded by MIL-STD-188-220, *Digital Message Transfer Device Subsystems, Interoperability Standard*. MIL-STD-188-220 was approved 19 April 1993.

Applicability: NA

Purpose: The purpose of this standard is to specify digital entry device interoperability standards.

Comments: This project is cancelled. The area/supply code for this document is TCSS.

Document #: MIL-STD-188-171

Title: *Interoperability Standards for Information and Record Traffic Exchange Mode I*

Key Word(s): Information and Record Traffic Exchange Mode I

Effective Date: 19 May 1989

Revision Level: Original 19 May 1989

Supersedence: This standard was originally numbered MIL-STD-188-116-1. The JCS at their April 1989 meeting decided that this standard would be renumbered MIL-STD-188-171.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to ensure interoperability and to promote commonality of communications equipment and subsystems using Mode 1 channel coordination procedures.

Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-172

Title: *Interoperability Standards for Information and Record Traffic Exchange Mode II*

Key Word(s): Information and Record Traffic Exchange Mode II

Effective Date: 7 December 1989

Revision Level: Original 07 Dec 1989

Supersedence: This standard replaces MIL-STD-188-116-2, *Interoperability Standards for Information and Record Traffic Exchange Mode II*, and previous Defense Communication Agency Circular, DCAC 370-0175-1.

Applicability: This standard is approved and mandatory for use within DoD.

Purpose: The purpose of this standard is to ensure interoperability and to promote commonality of communications equipment using the Mode II channel coordination procedure.

Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-173

Title: *Interoperability Standards for Information and Record Traffic Exchange Mode V*

Key Word(s): Information and Record Traffic Exchange Mode V

Effective Date: 19 May 1989

Revision Level: Original 19 May 1989

Supersedence: MIL-STD-188-173 replaces MIL-STD-188-116-3, *Interoperability Standards for Information and Record Traffic Exchange Mode V*.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to ensure interoperability and to promote commonality of communications equipment and subsystems using Mode V channel coordination procedures.

Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-174

Title: *Interoperability Standards for Information and Traffic Exchange Mode VI*

Key Word(s): Information and Traffic Exchange Mode VI

Effective Date: 1 March 1990

Revision Level: Original 01 Mar 1990

Supersedence: This standard supersedes MIL-STD-188-116-4 which was cancelled by Notice 1 on 14 June 1990.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to ensure interoperability and to promote commonality of communications equipment and subsystems using Mode VI channel coordination procedures.

Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-175

Title: *Interoperability Standards for Information and Record Traffic Exchange (Mode VII)*

Key Word(s): Information and Record Traffic Exchange Mode VII

Effective Date: June 1989

Revision Level: Original Jun 1989

Supersedence: MIL-STD-188-175 supersedes MIL-STD-188-116-5, *Interoperability Standards for Information and Record Traffic Exchange Mode VII*.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to ensure interoperability and to promote commonality of communications equipment and subsystems using Mode VII channel coordination procedures.

Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-181

Title: *Interoperability Standard for Dedicated 5 kHz and 25 kHz UHF Satellite Communications Channels*

Key Word(s): Satellite Communications Channels

Effective Date: 18 September 1992

Revision Level: Original 18 Sep 1992

Supersedence: NA

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to define all technical characteristics essential for interoperability and performance of satellite communications (SATCOM) terminals that use dedicated 5-kHz and 25-kHz ultra-high frequency SATCOM transponder channels.

Comments: The area/supply code for this document is AREA TCSS.

Document #: MIL-STD-188-182

Title: *Interoperability Standard for 5 kHz UHF DAMA Terminal Waveform*

Key Word(s): UHF DAMA Terminal Waveform

Effective Date: 18 September 1992

Revision Level: Original 18 Sep 1992

Supersedence: NA

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to define all technical characteristics essential for interoperability and performance of satellite communications (SATCOM) terminals using 5-kHz ultra-high frequency demand-assigned multiple access (DAMA) SATCOM transponder channels.

Comments: The area/supply code for this document is AREA TCSS.

Document #: MIL-STD-188-183

Title: *Interoperability Standard for 25-kHz UHF TDMA/DAMA Terminal Waveform*

Key Word(s): UHF TDMA/DAMA Terminal Waveform

Effective Date: 18 September 1992

Revision Level: Original 18 Sep 1992

Supersedence: NA

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to define all technical characteristics essential for interoperability and performance of satellite communications (SATCOM) terminals that use 25-kHz ultra-high frequency demand-assigned multiple access (DAMA) SATCOM transponder channels.

Comments: The area/supply code for this document is AREA TCSS.

Document #: MIL-STD-188-184

Title: *Data Control Waveform, Interoperability and Performance Standard for*

Key Word(s): UHF Satellite Communications, Data Controller

Effective Date: 20 August 1993

Revision Level: Original 20 Aug 1993

Supersedence: NA

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to define all technical characteristics essential for an advanced UHF satellite data controller.

Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-185

Title: *UHF Satellite Communications Demand Assigned Multiple Access (DAMA) Controllers Standards*

Key Word(s): UHF Satellite Communications

Effective Date: When Approved

Revision Level: NA

Supersedence: NA

Applicability: This project, when completed and approved, would develop a standard mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to define all technical characteristics essential for UHF satellite communications DAMA controllers.

Comments: On 12-14 January 1993, a Working Group Meeting for the standard was held. Requirements for a DAMA controller must be defined so that work on this project can continue. The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-190

Title: *Methods for Communications Systems Measurements*

Key Word(s): Communications Systems Measurements

Effective Date: 31 January 1990

Revision Level: Original 31 Jan 1990

Supersedence: NA

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to establish methods for measuring electrical parameter requirements that are specified in the MIL-STD-188 series of documents.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-194

Title: *Integrated Services Digital Network Profile (ISDNP)*

Key Word(s): Integrated Services Digital Network Profile, ISDNP

Effective Date: 15 June 1992

Revision Level: Original 15 Jun 1992

Supersedence: NA

Applicability: This standard is approved and mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to provide a standard reference to be used by all DoD activities and associated organizations when acquiring ISDN products, systems or services.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-196

Title: *Bi-Level Image Compression for the National Imagery Transmission Format Standard (NITFS)*

Key Word(s): National Imagery Transmission Format Standard, NITFS

Effective Date: 30 June 1993

Revision Level: Original 30 Jun 1993

Supersedence: NA

Applicability: This standard is applicable to the Intelligence Community and DoD. It is mandatory for all Secondary Imagery Dissemination Systems (SIDS) in accordance with the memorandum by the Assistant Secretary of Defense for C³I, Subject: National Imagery Transmission Format Standard (NITFS), 12 August 1991.

Purpose: The purpose of this standard is to provide technical details on the NITFS compression algorithm designated by the code C1 in the image compression field of the image subheader for bi-level images or overlays. It also provides the required run-length code tables for use in SIDS complying with NITFS.

Comments: The area/supply code for this document is AREA TCSS.

Document #: MIL-STD-188-197

Title: *Adaptive Recursive Interpolated Differential Pulse Code Modulated (ARIDPCM) Compression Algorithm for the National Imagery Transmission Format Standard (NITFS)*

Key Word(s): National Imagery Transmission Format Standard, NITFS

Effective Date: 30 June 1993

Revision Level: Original 30 Jun 1993

Supersedence: NA

Applicability: This standard is applicable to the Intelligence Community and DoD. It is mandatory for all Secondary Imagery Dissemination Systems (SIDS) in accordance with the memorandum by the Assistant Secretary of Defense for C³I, Subject National Imagery Transmission Format Standard (NITFS), dated 12 August 1991.

Purpose: The purpose of this standard is to provide technical details on the NITFS compression algorithm designated by the code C2 in the image compression field of the image subheader, ARIDPCM, for both 8- and 11-bit gray scale imagery. It also provides the required default ARIDPCM quantization tables for use in NITFS compliant SIDS.

Comments: The area/supply code for this document is AREA TCSS.

Document #: MIL-STD-188-198

Title: *Joint Photographic Experts Group (JPEG) Image Compression for the National Imagery Transmission Format Standard (NITSF)*

Key Word(s): National Imagery Transmission Format Standard, NITSF

Effective Date: 30 June 1993

Revision Level: Original 30 Jun 1993

Supersedence: NA

Applicability: This standard is applicable to the Intelligence Community and DoD. It is mandatory for all Secondary Imagery Dissemination Systems (SIDS) in accordance with the memorandum by the Assistant Secretary of Defense for C³I, Subject: National Imagery Transmission Format Standard (NITFS), 12 August 1991.

Purpose: The purpose of this standard is to provide technical details on the NITFS compression algorithm designated by the code C3 in the image compression field of the NITF file image subheader, JPEG for both 8- and 12-bit gray scale imagery and 24-bit color imagery.

Comments: The area/supply code for this document is AREA TCSS.

5.4 DISA MIL-STD-188-200 SERIES TACTICAL TELECOMMUNICATIONS STANDARDS

Summaries of DISA tactical/long-haul telecommunications standards are presented in this subsection.

Document #: MIL-STD-188-200

Title: *System Design and Engineering Standards for Tactical Communications*

Key Word(s): Tactical Communications

Effective Date: 28 June 1983

Revision Level: Original 28 Jun 1983

Supersedence: MIL-STD-188-200 supersedes MIL-STD-188C, including Change Notices 1 and 2, with the exception of paragraphs 6.2 and 6.3 and subparagraphs 4.5.6 through 4.5.11.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: This purpose of this standard is to detail system design and engineering standards for tactical communications systems.

Comments: A Change Notice 1 was developed and later reviewed. This change was documented in a coordination draft, dated 30 June 1988. However, this change was never published. The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-202

Title: *Interoperability and Performance Standards for Tactical Digital Transmission Groups (Coaxial Cables)*

Key Word(s): Tactical Digital Transmission Groups

Effective Date: 14 August 1989

Revision Level: Original 14 Aug 1989

Supersedence: NA

Applicability: This standard is mandatory for use within DoD.

Purpose: The purpose of this standard is to establish technical standards and design objectives (DOs) for the coaxial cable interface of time-division multiplexed (TDM) digital transmission groups (DTGs) for tactical applications.

Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-203-1A

Title: *Interoperability and Performance Standards for Tactical Digital Information Link (TADIL) A*

Key Word(s): TADIL A

Effective Date: 8 January 1988

Revision Level: Rev A 08 Jan 1988
 Original 10 Sep 1982

Supersedence: Revision A of MIL-STD-188-203-1 supersedes the base standard, dated 10 September 1982.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to establish technical standards and design objectives that are necessary to ensure and promote interoperability for communications equipment subsystems used in TADIL A.

Comments: Certain provisions of this standard are the subject of International Standardization Agreement STANAG 5511. Changes to this standard are coordinated through appropriate international channels. The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-203-2

Title: *Subsystem Design and Engineering Standards for Tactical Digital Information Link (TADIL) B*

Key Word(s): TADIL B

Effective Date: 4 November 1992

Revision Level:: Cancelled by Notice 1
 Notice 1 04 Nov 1992
 Original 23 Mar 1984

Supersedence: This standard is superseded by MIL-STD-188-212, same title, same contents. The standard was cancelled by Notice 1, dated 4 November 1992.

Applicability: NA

Purpose: The purpose of this standard is to establish technical standards and design objectives that are necessary to ensure interoperability and to promote commonality for communications equipment and subsystems used in TADIL B.

Comments: Certain provisions of this standard are the subject of International Standardization Agreement STANAG 5501. Changes to this standard are coordinated through appropriate international channels. The area/supply code for this document is AREA TCSS.

Document #: MIL-STD-188-203-3

Title: *Subsystem Design and Engineering Standards for Tactical Digital Information Link (TADIL) C*

Key Word(s): TADIL C

Effective Date: 5 October 1983

Revision Level: Original 05 Oct 1983

Supersedence: NA

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to establish technical standards and design objectives that are necessary to ensure interoperability and to promote commonality for communications equipment and subsystems used in TADIL C.

Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-203-4

Title: *Interoperability and Performance Standards for Tactical Digital Information Link (TADIL) J*

Key Word(s): TADIL J

Effective Date: NA

Revision Level: Cancelled April 1989

Supersedence: This standard was cancelled at the 66th JTSSG meeting of April 1989, in favor of NATO STANAG 4175, MIDS, as the TADIL-J standard.

Applicability: NA

Purpose: The purpose of this standard was to establish technical standards and design objectives that are necessary to ensure interoperability and to promote commonality for communications equipment and subsystems used in TADIL J.

Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-212

Title: *Subsystem Design and Engineering Standards for Tactical Digital Information Link (TADIL) B*

Key Word(s): TADIL B

Effective Date: 17 October 1992

Revision Level: Original 17 Oct 1992

Supersedence: This standard supersedes MIL-STD-203-2 which was cancelled 4 November 1992.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to establish technical standards and design objectives that are necessary to ensure interoperability and to promote commonality for communications equipment and subsystems used in TADIL B.

Comments: Certain provisions of this standard are the subject of International Standardization Agreement STANAG 5501. Changes to this standard are coordinated through appropriate international channels. The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-216A

Title: *Interoperability Standards for Data Adapter Control Mode*

Key Word(s): Data Adapter Control Mode

Effective Date: 20 February 1993

Revision Level: Rev A 20 Feb 1993
Notice 1 15 Jun 1990
Original 09 Mar 1987

Supersedence: Revision A of this standard supersedes MIL-STD-188-216, dated 9 March 1987. See comments.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to establish technical standards and design objectives that are necessary to ensure interoperability and to promote commonality for communications equipment and subsystems using Data Adapter Control Mode (DACM) procedures.

Comments: This standard supersedes paragraphs 3.2.2 through 3.2.6 and Appendix I of the Joint Tactical Communications Office (JTCO) specification TT-A3-9013-0048B. The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-220

Title: *Digital Message Transfer Device Subsystems, Interoperability Standard for*

Key Word(s): Digital Message Transfer Device

Effective Date: 7 May 1993

Revision Level: Original 07 May 1993

Supersedence: MIL-STD-188-220 supersedes MIL-STD-188-163, *Digital Entry Device Interoperability Standards*.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to provide an interoperability standard for digital message transfer device subsystems.

Comments: The area/supply code for this document is AREA TCSS.

Document #: MIL-STD-188-242

Title: *Interoperability and Performance Standards for Tactical Single Channel Very High Frequency (VHF) Radio Equipment*

Key Word(s): Tactical Single Channel VHF Radio

Effective Date: 20 June 1985

Revision Level: Original 20 Jun 1985

Supersedence: NA

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to provide interoperability and performance standards for tactical single channel VHF radio equipment.

Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-243

Title: *Interoperability and Performance Standards for Tactical Single Channel Ultra High Frequency (UHF) Radio Communications*

Key Word(s): Tactical Single Channel UHF Radio

Effective Date: 15 March 1989

Revision Level: Original 15 Mar 1989

Supersedence: NA

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to provide interoperability and performance standards for tactical single-channel UHF radio communications.

Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-244

Title: *Interoperability and Performance Standards for UHF Frequency Hopping Tactical Radio System*

Key Word(s): UHF Frequency Hopping Tactical Radio

Effective Date: When Approved.

Revision Level: NA

Supersedence: NA

Applicability: This standard, when completed, will be mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to establish technical standards and design objectives that are necessary to ensure interoperability and to promote commonality for UHF frequency-hopping tactical radio systems.

Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-256A

Title: *Interoperability and Performance Standards for Digital Signalling and Supervision of Tactical Communications*

Key Word(s): Digital Signalling

Effective Date: NA

Revision Level: Cancelled Oct 1990

Supersedence: This standard was cancelled at the 72nd JTSSG meeting, October 1990, and converted to a mandatory Technical Interface Specification (TIS).

Applicability: NA

Purpose: The purpose of this standard is to provide interoperability and performance standards for digital signalling and supervision of tactical communications.

Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-260

Title: *Design and Engineering Standards for Tactical Terminal Subsystems*

Key Word(s): Tactical Terminal Subsystems

Effective Date: NA

Revision Level: Original 01 Feb 1985

Supersedence: This standard supersedes paragraphs 6.2 and 6.3 of MIL-STD-188C.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: This standard promulgates mandatory system standards and optional design objectives for digital and analog terminal equipment and subsystems to ensure interoperability among terminal subsystems and between terminal subsystems and transmission subsystems that are standardized in the MIL-STD-188 series. This standard also promotes compatibility and commonality among tactical terminal equipment and establishes a level of performance for tactical terminal equipment and subsystems necessary to satisfy the requirements of a majority of users.

Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-STD-188-283

Title: *Interoperability and Interface Standard for Tactical Fiber Optic Communications*

Key Word(s): Fiber Optic Communications

Effective Date: NA

Revision Level: Cancelled Jan 1993
Final Draft 27 Jun 1989

Supersedence: This project was cancelled at the 81st JTSSG meeting in January 1993. General information on this subject is to be added to MIL-STD-188-111A, *Interoperability and Performance Standards for Fiber Optic Communications Systems*.

Applicability: NA

Purpose: The purpose of this standard is to provide mandatory system standards and optional design objectives necessary to ensure interoperability and to promote compatibility with tactical fiber optic links and between fiber optic links and other transmission links.

Comments: Some parts of this standard will be included in a Joint Interoperability and Engineering Organization (JIEO) Technical Interface Specification (TIS) 91009 rather than a 188-series standard. Other useful information is in MIL-HDBK-415A, *Design Handbook for Fiber Optic Communications Systems*, currently in the approval cycle. The area/supply code for this document is AREA TCTS.

5.5 DISA MIL-STD-188-300 SERIES LONG-HAUL TELECOMMUNICATIONS STANDARDS

Summaries of DISA long-haul telecommunications standards are presented in this subsection.

Document #: MIL-STD-188-300

Title: *Standards for Long Haul Communications System Design Standards Applicable to the Defense Communications System*

Key Word(s): Long Haul, DCS

Effective Date: NA

Revision Level: Cancelled by Notice 1
Notice 1 01 May 1973
Original 15 Jul 1971

Supersedence: MIL-STD-188-300 was cancelled by Notice 1 of 1 May 1973. For information on this subject, refer to MIL-STD-188-100, *Common Long Haul and Tactical Communications System Technical Standards*.

Applicability: NA

Purpose: The purpose of this standard is to provide standards for system design of long-haul communications for the Defense Communications System.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-310A

Title: *Subsystem Design and Engineering Standards for Technical Control Facilities*

Key Word(s): Technical Control Facilities

Effective Date: NA

Revision Level: Cancelled by Notice 1
Notice 1 05 May 1989
Rev A 14 Jan 1980
Original 02 Aug 1971

Supersedence: This standard was cancelled by Notice 1, and superseded by MIL-STD-188-154.

Applicability: NA

Purpose: The purpose of this standard is to establish criteria for engineering fixed Technical Control Facilities and associated Patch and Test Facilities in DoD.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-311

Title: *Technical Design Standards for Frequency Division Multiplexers*

Key Word(s): Frequency Division Multiplexers

Effective Date: 31 December 1980

Revision Level: Notice 1 31 Dec 1980
Original 10 Dec 1971

Supersedence: This standard supersedes Defense Communications Agency Circular, DCAC 330-175-1.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to establish electrical performance requirements for FDM equipment used in the DCS and semi-fixed tactical service. The standard defines the interface levels at interconnection points to and from local telephone facilities and to and from long-distance communication trunks.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-313

Title: *Subsystem Design and Engineering Standards and Equipment, Technical Design Standards for Long Haul Communications Transversing Microwave LOS Radio and Tropospheric Scatter Radio*

Key Word(s): Long Haul, Transversing Microwave LOS Radio, Troposcatter

Effective Date: NA

Revision Level: Cancelled by Notice 1
Notice 1 05 May 1989
Original 19 Dec 1973

Supersedence: This standard was cancelled by Notice 1. This standard superseded paragraphs 3.2.2.4-3.2.2.4.8.3.2 and 3.2.2.5-3.2.2.5.5.3.4 of Defense Communications Agency Circular DCAC 330-175-1. A new standard, MIL-STD-188-144, *Subsystem Design and Engineering Standards for Common Long Haul/Tactical Tropospheric Scatter Radio Communications* has been initiated. Also related to this standard is MIL-STD-188-145, *Interoperability and Performance Standards for Digital LOS Microwave Radio Equipment*.

Applicability: NA

Purpose: The purpose of this standard is to provide technical design standards for the performance of new FDM/FM subsystems and equipment in LOS and tropospheric-scatter radio transmission systems used in long-haul communications. LOS subsystems normally operate in the 4-13 GHz range; tropospheric in the 0.4-5.0 GHz range.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-315

Title: *Subsystem Design and Engineering and Equipment, Technical Design Standards for Wire Systems*

Key Word(s): Wire Systems

Effective Date: NA

Revision Level: Cancelled by Notice 1
Notice 1 30 Dec 1983
Original 30 Jul 1971

Supersedence: This standard was cancelled by Notice 1 and is superseded by MIL-STD-188-112, *Subsystem Design and Engineering Standards for Common Long Haul/Tactical Cable and Wire Communications*.

Applicability: NA

Purpose: The purpose of this standard is to provide technical design and engineering standards for broadband cable circuits common to analog/frequency-division systems in the long-haul communications system of DoD (DCS) and the National Military Communications System (NMCS) or to the authorized upgrading of existing DCS and NMCS subsystems. Submarine cables and installations are not included.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-317

Title: *System Design and Engineering Standards and Equipment, Technical Design Standards for High Frequency Radio*

Key Word(s): High Frequency Radio, HF

Effective Date: NA

Revision Level: Cancelled by Notice 1
Notice 1 10 Oct 1986
Original 30 Mar 1972

Supersedence: This standard was cancelled by Notice 1. This standard superseded paragraphs 3.2.2.2-3.2.2.2.8 and 5.2.2-5.2.2.9.2 of Defense Communication Agency Circular DCAC 320-175-1. MIL-STD-188-317 was cancelled by Notice 1, and is superseded by MIL-STD-188-141A, *Interoperability and Performance Standards for Medium and High Frequency Radio Equipment*.

Applicability: NA

Purpose: The purpose of this standard is to provide technical design standards for design and installation of new and upgraded existing HF radio subsystems and equipment used in long-haul communications.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-318

Title: *System and Subsystem Design and Engineering and Equipment, Technical Standards for Closed Circuit Television (CCTV) Systems*

Key Word(s): Closed Circuit Television, CCTV

Effective Date: 14 June 1985

Revision Level: Original 14 Jun 1985

Supersedence: NA

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to provide system and subsystem design and engineering and equipment technical standards for closed circuit television (CCTV) systems.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-322

Title: *Subsystem Design/Engineering and Equipment Technical Design Standards For Long-Haul Line of Sight (LOS) Digital Microwave Radio Transmission*

Key Word(s): Long-Haul, LOS Digital Microwave Radio

Effective Date: NA

Revision Level: Cancelled by Notice 2
 Notice 2 29 Jul 1988
 Notice 1 02 Feb 1984
 Original 01 Nov 1976

Supersedence: This standard was cancelled by Notice 2, and is superseded by MIL-STD-188-145, *Interoperability and Performance Standards for Digital LOS Microwave Radio Equipment*.

Applicability: NA

Purpose: The purpose of this standard is to provide performance and design standards for new and (to the maximum extent possible) converted digital microwave radio links and equipment for long-haul line-of-sight (LOS) digital microwave transmission. Such systems normally operate in the 4.4-5.0, 7.125-8.4, and 14.4-15.4 GHz ranges.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-323

Title: *DCS Digital Transmission Performance Standard*

Key Word(s): DCS Digital Transmission

Effective Date: When Approved

Revision Level: Coordination Draft 2nd Qtr 1992

Supersedence: NA

Applicability: This standard, when completed and approved, will be mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to provide end-to-end system configuration functions, performance and design standards for long-haul Defense Communication System digital transmission.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-331

Title: *Interoperability and Performance Standard for Video Teleconferencing*

Key Word(s): Video Teleconferencing

Effective Date: When Approved

Revision Level: Draft 10 Nov 1993

Supersedence: NA

Applicability: This standard will be mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to provide DoD with interoperability between video teleconferencing terminal equipments.

Comments: The area/supply code for this document is AREA TCSS.

Document #: MIL-STD-188-340

Title: *Equipment Technical Design Standards for Voice Order-Wire Multiplex*

Key Word(s): Voice Order-Wire Multiplex

Effective Date: 28 July 1977

Revision Level: Notice 1 28 Jul 1977
 Original 21 May 1971

Supersedence: NA

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to define characteristics for all frequency-division order-wire multiplexers procured for the DCS for use primarily on wideband-radio transmission systems.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-341

Title: *Non-Diversity Digital Data Modems (2400 bps)*

Key Word(s): Modems

Effective Date: NA

Revision Level: Cancelled by Notice 1
 Notice 1 03 Feb 1984
 Original 15 Feb 1971

Supersedence: MIL-STD-188-341 was cancelled by Notice 1 and is superseded by MIL-STD-188-110, *Interoperability and Performance Standards for Data Modems*.

Applicability: NA

Purpose: The purpose of this standard is to specify the minimum performance and interface requirements for 2400-bps (bits per second) modems (Modulator/demodulators) for use on normal 4-kHz channels meeting DCS 51, BELL 3002-C2 (formerly Bell 4B), or equivalent conditioning requirements. Such channels are typically derived from FDM equipment associated with LOS microwave, coaxial-cable, submarine-cable, troposcatter, and satellite transmission systems.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-342

Title: *Equipment Technical Design Standards for Voice Frequency Carrier Telegraph (FSK)*

Key Word(s): Voice Frequency Carrier Telegraph, FSK

Effective Date: 29 February 1972

Revision Level: Original 29 Feb 1972

Supersedence: This standard supersedes Defense Communications Agency Circular DCAC 330-175-1, paragraphs 3.2.4.2-3.2.4.2.9 and 5.7.9.5.4.

Applicability: This standard is mandatory for use by all departments and agencies of DoD.

Purpose: This standard provides the technical design standards for multi-channel, frequency-shift-keyed, voice-frequency, carrier telegraph (VFCT) terminals, which operate at rates not exceeding 75 bits per second. Intended use is in the design and installation of new VFCT equipment and also in the upgrading of existing equipment used in long-haul communications.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-344

Title: *Non-Diversity Digital Data Modem, 1200 Bits Per Second*

Key Word(s): Modems

Effective Date: NA

Revision Level: Cancelled by Notice 2
Notice 2 03 Feb 1984
Notice 1 08 Dec 1977
Original 01 Jun 1972

Supersedence: MIL-STD-188-344 was cancelled by Notice 2, and is superseded by MIL-STD-188-110.

Applicability: NA

Purpose: The purpose of this standard is to specify the minimum performance and interface requirements for 1200 bps (bits per second) modems (modulator/demodulators) for use on nominal 4-kHz channels meeting AUTOVON 5-2, Bell 3002-C2 (formerly Bell 4B), or equivalent conditioning requirements. Typically, such channels are derived from FDM equipment associated with LOS microwave, coaxial-cable, troposcatter, and satellite transmission systems.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-346

Title: *Equipment Technical Design Standards for Analog End Instruments and Central Office Ancillary Devices*

Key Word(s): Analog End Instruments

Effective Date: 30 November 1973

Revision Level: Original 30 Nov 1973

Supersedence: This standard supersedes Defense Communications Agency Circular DCAC 330-175-1, paragraphs 3.4.3-3.4.3.4.

Applicability: This standard is approved for use by all departments and agencies of DoD.

Purpose: This standard establishes design standards for analog end instruments and central-office ancillary devices used in long-haul communications systems within the Defense Communications System (DCS) and the National Military Command System (NMCS).

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-347

Title: *Equipment Technical Design Standards for Digital End Instruments and Ancillary Devices*

Key Word(s): Digital End Instruments

Effective Date: 29 March 1973

Revision Level: Original 29 Mar 1973

Supersedence: This standard supersedes Defense Communications Agency Circular DCAC 330-175-1, paragraphs 3.4.1 and 3.4.4.

Applicability: This standard is approved for use by all departments and agencies of DoD.

Purpose: This standard provides technical design standards and test criteria for digital end instruments and ancillary devices for use in the terminal area of a long-haul communications system. This standard is approved for use in designing, installing, and operating new communications facilities, and in upgrading existing subsystems and equipment.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-STD-188-348

Title: *Telecommunications: Interoperability Requirements for Trunked Land Mobile Radio (LMR) System Signalling Operating With Analog and 25 kHz Channel Digital Radios*

Key Word(s): Land Mobile Radio, LMR

Effective Date: When Approved

Revision Level: Coordination Draft 22 Oct 1993

Supersedence: NA

Applicability: This standard, when completed, will be approved for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to define interoperability, minimum performance, and interface requirements for trunked LMR systems.

Comments: The Federal Government is licensed by Motorola, Inc., to use the technology in this standard. The area/supply code for this document is AREA TCSS.

Document #: MIL-STD-188-350

Title: *Long Haul Digital Circuit Switching*

Key Word(s): Circuit Switching

Effective Date: When Approved

Revision Level: Draft Jan 1991

Supersedence: NA

Applicability: This standard, when completed, will be approved for use by all departments and agencies of DoD.

Purpose: The purpose of this standard is to define interoperability and interface requirements for long-haul digital circuit switching.

Comments: This project has been on hold since January 1991. The area/supply code for this document is AREA SLHC.

5.6 DISA MIL-HDBK SERIES TELECOMMUNICATIONS HANDBOOKS

Summaries of DISA telecommunications handbooks are presented in this subsection.

Document #: MIL-HDBK-188, Volumes I, II & III

Title: *Guide for Developers and Users of Communications Systems in the MIL-STD-188 Series*

Key Word(s): Communications Systems

Effective Date: Volumes I and II 21 Jan 1983
Volume III 31 Jul 1985

Revision Level: Original

Supersedence: NA

Applicability: This handbook is approved for use by all departments and agencies of DoD.

Purpose: The purpose of this handbook is to provide guidance and reference sources for standardization policies, programs and organizations that influence documents in the MIL-STD-188 series. The handbook also provides guidance on the methods and procedures for the development of MIL-STD-188 series documents.

Comments: Volume I *Development and Use/Organizational Relationships*
Volume II *Details Concerning Standardization Organization.*
Volume III *Selection Guide for Published Telecommunications-Related Standards, Specifications and Handbooks.*

Volumes IA and IIA project was cancelled in April 1992, and a new project was initiated. The area/supply code for this document is AREA SLHC /TCTS.

Document #: MIL-HDBK-232A

Title: *Red/Black Engineering Installation Guidelines*

Key Word(s): Red/Black Engineering

Effective Date: 25 July 1988

Revision Level: Notice 1 25 Jul 1988
Rev A 20 Mar 1987
Original 25 Apr 1980

Supersedence: NA

Applicability: This handbook is approved for use by all departments and agencies of DoD.

Purpose: The purpose of this handbook is to provide guidance and reference sources for Red/Black facilities installation.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-HDBK-411B

Title: *Power and Environment for Sensitive DoD Electronic Equipment, Volumes I, II and III*

Key Word(s): Power for Electronic Equipment

Effective Date: 15 May 1990

Revision Level: Rev B 15 May 1990
Rev A 08 Jul 1982
Original 21 May 1971

Supersedence: MIL-HDBK-411B supersedes MIL-HDBK-411A.

Applicability: This handbook is approved for use by all departments and agencies of DoD.

Purpose: The purpose of this handbook is to provide technical guidance for the design and upgrade of power facilities within the physical plant of the Defense Communications System (DCS)

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-HDBK-412

Title: *Site Survey and Facility Design Handbook for Satellite Earth Stations*

Key Word(s): Satellite Earth Stations

Effective Date: 20 May 1981

Revision Level: Original 20 May 1981

Supersedence: NA

Applicability: This handbook is approved for use by all departments and agencies of DoD.

Purpose: The purpose of this handbook is to provide general technical information pertaining to facility engineering of satellite earth stations, both fixed and transportable, and to serve as a guide to more detailed information contained in referenced engineering and planning publications.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-HDBK-413

Title: *Design Handbook for High Frequency Radio Communications Systems*

Key Word(s): HF Radio Communications

Effective Date: 26 March 1986

Revision Level: Original 26 Mar 1986

Supersedence: NA

Applicability: This handbook applies to Government-owned and operated HF radio systems and equipment, Government-owned and contractor-operated HF radio systems and equipment and other HF radio facilities provided by DoD resources.

Purpose: The purpose of this handbook is to provide uniform guidelines for communications engineers and staff planners for the implementation of HF radio communications systems.

Comments: The area/supply code for this document is AREA SLHC/TCTS.

Document #: MIL-HDBK-414

Title: *Technical Control Facilities and Equipment for Long Haul Communications, Volumes I and II*

Key Word(s): Long Haul Communications

Effective Date: 23 September 1988

Revision Level: Cancelled by Notice 1
Notice 1 23 Sep 1988
Original 23 Mar 1981

Supersedence: This standard was cancelled by Notice 1, dated 23 September 1988.

Applicability: NA

Purpose: The purpose of this handbook is to provide pertinent information regarding the application and electrical characteristics of equipment employed in Technical Control or Patch and Test Facilities in the Defense Communication System.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-HDBK-415

Title: *Design Handbook for Optic Communications*

Key Word(s): Optic Communications

Effective Date: 1 February 1985

Revision Level: Original 01 Feb 1985

Supersedence: MIL-HDBK-415A was in final stages of approval as of 9 December 1993.

Applicability: This handbook is approved for use by all departments and agencies of DoD.

Purpose: The purpose of this handbook is to provide uniform DoD guidelines for communication engineers, and installation, operation and maintenance personnel working with fiber optic communications systems.

Comments: The area/supply code for this document is AREA SLHC/TCTS.

Document #: MIL-HDBK-416

Title: *Facility Design Handbook for Line-of-Sight (LOS) Microwave Communications*

Key Word(s): LOS Microwave Communications

Effective Date: 15 November 1977

Revision Level: Original 15 Nov 1977

Supersedence: NA

Applicability: This handbook is approved for use by all departments and agencies of DoD.

Purpose: The purpose of this handbook is to provide methods for microwave LOS link and system design.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-HDBK-417

Title: *Facility Design Handbook for Tropospheric Scatter*

Key Word(s): Tropospheric Scatter, Troposcatter

Effective Date: 25 November 1977

Revision Level: Original 25 Nov 1977

Supersedence: NA

Applicability: This handbook is approved for use by all departments and agencies of DoD.

Purpose: The purpose of this handbook is to assist suitably qualified personnel in designing trans-horizon systems to current state-of-the art standards.

Comments: The area/supply code for this document is AREA SLHC.

Document #: MIL-HDBK-418

Title: *Design and Installation Guide for Digital Interface Circuits*

Key Word(s): Digital Interface Circuits

Effective Date: NA

Revision Level: Cancelled Jul 1990

Supersedence: NA

Applicability: NA

Purpose: The purpose of this handbook is to provide design and installation guidance for digital interface circuits.

Comments: This project was cancelled due to lack of funding in July 1990. A draft handbook was never produced. The area/supply code for this document is AREA SLHC.

Document #: MIL-HDBK-419A

Title: *Grounding, Bonding and Shielding for Electronic Equipment and Facilities, Volumes I and II*

Key Word(s): Grounding, Bonding, and Shielding

Effective Date: 29 December 1987

Revision Level: Rev A 29 Dec 1987
Original 21 Jun 1982

Supersedence: MIL-HDBK-419A superseded MIL-HDBK-419.

Applicability: This handbook is approved for use by all departments and agencies of DoD.

Purpose: The purpose of this handbook is to address the practical considerations for engineering of ground systems, subsystems and other components of ground networks.

Comments: This handbook was developed by the Air Force Communication Command (AFCC) and implements the requirements of MIL-STD-188-124B, *Grounding, Bonding and Shielding for Common Long Haul/Tactical Communications Systems Including Ground Based Communications-Electronics Facilities and Equipments*, which is mandatory for use within DoD. Volume I addresses basic theory, and Volume II addresses applications. The area/supply code for this document is AREA SLHC/TCTS.

Document #: MIL-HDBK-420

Title: *Site Survey Handbook for Communications Facilities*

Key Word(s): Communications Facilities

Effective Date: 20 March 1987

Revision Level: Original 20 Mar 1987

Supersedence: NA

Applicability: This handbook is approved for use by all departments and agencies of DoD.

Purpose: The purpose of this handbook is to describe responsibilities and suggest procedures for conducting site surveys.

Comments: This handbook is not intended to serve as a stand-alone comprehensive reference. It is to be used in conjunction with existing site-specific handbooks and other applicable documents to identify requirements needed to support the acquisition, establishment, or upgrading of telecommunications sites. The area/supply code for this document is AREA SLHC.

Document #: MIL-HDBK-421

Title: *Communications Timing and Synchronization Subsystems*

Key Word(s): Timing and Synchronization Subsystems

Effective Date: 17 May 1991

Revision Level: Original 17 May 1991

Supersedence: NA

Applicability: This handbook is approved for use by all departments and agencies of DoD.

Purpose: The purpose of this handbook is to provide assistance to engineers and staff planners in understanding military communications timing and synchronization subsystems.

Comments: The area/supply code for this document is AREA TCTS.

Document #: MIL-HDBK-423

Title: *High-Altitude Electromagnetic Pulse (HEMP) Protection for Fixed and Transportable Ground-Based Facilities - Volume I Fixed Facilities, Volume II Transportable Facilities*

Key Word(s): HEMP

Effective Date: 15 March 1993

Revision Level: Original 15 Mar 1993

Supersedence: NA

Applicability: This handbook is approved for use by all departments and agencies of DoD.

Purpose: The purpose of this handbook is to provide information to managers and engineers responsible for the design, construction, testing, and hardness maintenance/hardness surveillance of fixed and transportable ground-based facilities that must be hardened against high-altitude electromagnetic pulses.

Comments: This handbook provides design guidance and examples of good practice to support compliance with the requirements of MIL-STD-188-125. The area/supply code for this document is AREA SLHC.

SECTION 6

NON-DoD FEDERAL EMC-RELATED DOCUMENTS

6.1 INTRODUCTION

The documents listed in this section of the handbook are developed by non-DoD agencies of the US Government. The documents include standards, rules, regulations, procedures, and handbooks that directly address EMC or EMC-related topics. These regulatory documents may have a very broad application or may apply only within the organization developing the document. In many instances, regulatory documents issued by one of the federal agencies may impact or override the requirements of those of another federal agency. For example, the regulations and procedures set forth by the National Telecommunications and Information Administration (NTIA) with respect to spectrum management must be followed by all other federal agencies.

Standards and regulations that may contain EMC requirements are issued by numerous agencies of the federal government. The documents listed in this section are those most often encountered in EMC analysis tasks. They are originated by the following agencies of the federal government:

- Federal Aviation Administration (FAA)
- Federal Communications Commission (FCC)
- Food and Drug Administration (FDA)
- National Telecommunications and Information Administration (NTIA)
- Occupational Safety and Health Administration (OSHA).

FAA EMC-Related Regulations are listed in Table 6-1 and described in Section 6.2. FCC EMC-Related Regulations are listed in Table 6-2 and described in Section 6.3. FDA EMC-Related Regulations are listed in Table 6-3 and described in Section 6.4. NTIA EMC-Related Regulations are listed in Table 6-4 and described in Section 6.5. OSHA EMC-Related Regulations are listed in Table 6-5 and described in Section 6.6.

Table 6-1. FAA EMC-Related Regulations

FAA STD-019b	<i>Lightning Protection, Grounding, Bonding and Shielding Requirements for Facilities</i>
FAA STD-020b	<i>Transient Protection, Grounding, Bonding and Shielding Requirements for Electronic Equipment</i>
FAA Order-3910.3A	<i>Radiation Health Hazards and Protection</i>
FAA Order-6050.19D	<i>Radio Spectrum Management and Use</i>
FAA Order-6050.22B	<i>Radio Frequency Interference Investigation and Reporting</i>
FAA Order-6050.32	<i>Spectrum Management Regulations and Procedures Manual</i>
FAA Order-6950.19	<i>Practices and Procedures For Lightning Protection, Grounding, Bonding, and Shielding Implementation</i>
FAA Order-6950.20	<i>Fundamental Considerations of Lightning Protection, Grounding, Bonding and Shielding</i>

Table 6-2. FCC EMC-Related Regulations

FCC Rules 47 CFR-2	<i>Frequency Allocations and Radio Treaty Matters: General Rules and Regulations</i>
FCC Rules 47 CFR-15	<i>Radio Frequency Devices</i>
FCC Rules 47 CFR-18	<i>Industrial, Scientific, and Medical (ISM) Equipment</i>
FCC Rules 47 CFR-21	<i>Domestic Public Fixed Radio Services</i>
FCC Rules 47 CFR-23	<i>International Fixed Public Radio-Communications Services</i>
FCC Rules 47 CFR- 25	<i>Satellite Communications</i>
FCC Rules 47 CFR-73	<i>Radio Broadcast Services</i>
FCC Rules 47 CFR-80	<i>Stations in the Maritime Services</i>
FCC Rules 47 CFR-87	<i>Aviation Services</i>
FCC Rules 47 CFR-90B	<i>Public Safety Radio Services</i>
FCC Rules 47 CFR-90D	<i>Industrial Radio Services</i>
FCC Rules 47 CFR-90E	<i>Land Transportation Radio Services</i>
FCC/OET Bulletin No. 62	<i>Understanding the FCC Regulations Concerning Computing Devices</i>
FCC/OST Bulletin No. 65	<i>Evaluating Compliance with FCC-Specified Guidelines for Human Exposure to Radio Frequency Radiation</i>
FCC/OST MP-4	<i>FCC Methods of Measurement of Radio Noise Emissions from Computing Devices</i>
FCC/OST MP-5	<i>FCC Methods of Measurement of Radio Noise Emissions from Industrial, Scientific, and Medical Equipment</i>

Table 6-3. FDA EMC-Related Regulations

MDS-201-0004	<i>Electromagnetic Compatibility Standard for Medical Devices</i>
FDA Contract No. 223-74-5083	<i>Labeling Requirements, Performance Requirements, and Terminology for Implantable Artificial Cardiac Pacemakers</i>
FDA Rules 21 CFR 1030	<i>Performance Standards for Microwave and Radio Frequency Emitting Products</i>
FDA Rules 21 CFR 1040	<i>Performance Standards for Light-Emitting Products</i>

Table 6-4. NTIA EMC-Related Regulations

NTIA Manual	<i>Manual of Regulations and Procedures for Federal Radio Frequency Management</i>
FED-STD-1002A	<i>Time and Frequency Information in Telecommunications Systems</i>
FED-STD-1016	<i>Analog to Digital Conversion of Radio Voice by 4800 bit/sec Code Excited Linear Prediction (CELP)</i>
FED-STD-1023	<i>Interoperability Requirements for Encrypted Digitized Voice Utilized with 25 kHz Channel FM Radios Operating Above 30 MHz</i>
FED-STD-1035A	<i>Coding, Modulation, and Transmission Requirements for Single Channel Medium and High Frequency Radiotelegraph Systems Used in Government Maritime Mobile Telecommunications</i>
FED-STD-1037B	<i>Telecommunications: Glossary of Telecommunications Terms</i>
FED-STD-1045A	<i>High Frequency (HF) Radio Automatic Link Establishment</i>
FED-STD-1046	<i>HF Radio Automatic Networking Section 1: Basic Networking - ALE Controller</i>
FED-STD-1049	<i>HF Radio Automatic Operation in Stressed Environments, Section 1: Linking Protection</i>

Table 6-5. OSHA EMC-Related Regulations

OSHA 29 CFR 1910.97	<i>Code of Federal Regulations Nonionizing Radiation Protection Guide</i>
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6.2 FAA EMC-RELATED DOCUMENTS

Summaries of FAA EMC-related documents are presented in this subsection.

Document #:	FAA STD-019b		
Title:	<i>Lightning Protection, Grounding, Bonding and Shielding Requirements for Facilities</i>		
Key Word(s):	Grounding, Bonding, and Shielding		
Effective Date:	28 August 1990		
Revision Level:	Rev B	28 Aug 1990	
	Rev A	26 Sep 1985	
Supersedence:	NA		
Applicability:	This document is applicable to the design and construction of facilities housing FAA electronic equipment and to the installation of electronic equipment.		
Purpose:	The purpose of this document is to define standard configurations and procedures for the application of lightning protection; surge and transient protection; and grounding, bonding, and shielding protection for facilities housing electronic equipment.		
Comments:	None		

Document #:	FAA STD-020b		
Title:	<i>Transient Protection, Grounding, Bonding and Shielding Requirements for Electronic Equipment</i>		
Key Word(s):	Grounding, Bonding and Shielding		
Effective Date:	11 May 1992		
Revision Level:	Rev B	11 May 1992	
	Rev A	26 Sep 1985	
Supersedence:	NA		
Applicability:	This document is applicable to FAA electronic equipment. This standard shall be applied to new electronic equipment or as modifications are made to existing electronic equipment.		
Purpose:	The purpose of this document is to define standard configurations and procedures to minimize damage from transient power surges. Procedures for grounding, bonding, and shielding are provided as well as criteria for protecting personnel from radiation hazards posed by electronic equipment used to support air traffic control functions.		
Comments:	None		

Document #: FAA Order-3910.3A

Title: *Radiation Health Hazards and Protection*

Key Word(s): Radiation Health Hazards

Effective Date: 19 October 1983

Revision Level: Original

Supersedence: NA

Applicability: This order is applicable to all FAA work places where radiation health hazards may exist.

Purpose: The purpose of this order is to establish criteria, standards, procedures, and guidelines for the recognition, evaluation, and control of radiation health hazards in FAA workplaces.

Comments: None

Document #: FAA Order-6050.19D

Title: *Radio Spectrum Management and Use*

Key Word(s): Spectrum Management

Effective Date: September 1984

Revision Level: Rev D Sep 1984

Supersedence: FAA Order-6050.19D replaces FAA Order-6050.19C.

Applicability: This order is applicable to FAA spectrum management engineers.

Purpose: The purpose of this order is to provide guidance for radio spectrum management and use.

Comments: None

Document #: FAA Order-6050.22B

Title: *Radio Frequency Interference Investigation and Reporting*

Key Word(s): RF Interference

Effective Date: September 1983

Revision Level: Rev B Sep 1983

Supersedence: NA

Applicability: This order is applicable to FAA operations that encounter RF interference.

Purpose: The purpose of this order is to provide procedures for FAA reporting and investigation of RF interference.

Comments: None

Document #: FAA Order-6050.32

Title: *Spectrum Management Regulations and Procedures Manual*

Key Word(s): Spectrum Management

Effective Date: 8 September 1987

Revision Level: Original 08 Sep 1987

Supersedence: All previous orders concerning spectrum management are cancelled except 6050.12C, *Circuit Handbook*; 6050.16B, *Voice Outlets for Automatic Terminal Information Service and Automated Weather Observation*; 6050.19C, *Radio Frequency Spectrum Utilization and Management*; and 6050.22B, *Radio Frequency Interference*.

Applicability: This order is applicable to FAA spectrum management engineers.

Purpose: The purpose of this order is to establish and describe the spectrum management function in the FAA. It presents spectrum engineering guidance, criteria, and policy to spectrum management engineers.

Comments: None

Document #: FAA Order-6950.19

Title: *Practices and Procedures For Lightning Protection, Grounding, Bonding, and Shielding Implementation*

Key Word(s): Lightning Protection, Grounding

Effective Date: July 1978

Revision Level: Original Jul 1978

Supersedence: NA

Applicability: This order is applicable for use by engineers responsible for design and construction of FAA facilities.

Purpose: The purpose of this order is to provide methods for implementation of protection grounding, bonding, and shielding for FAA facilities.

Comments: None

Document #: FAA Order-6950.20

Title: *Fundamental Considerations of Lightning Protection, Grounding, Bonding and Shielding*

Key Word(s): Grounding, Bonding, and Shielding

Effective Date: July 1978

Revision Level: Original Jul 1978

Supersedence: NA

Applicability: This order is applicable to engineers responsible for planning FAA installations and facilities.

Purpose: The purpose of this order is to provide fundamental consideration of lightning protection, grounding, bonding, and shielding to FAA planners of installations and facilities.

Comments: None

6.3 FCC EMC-RELATED DOCUMENTS

Summaries of FCC EMC-related documents are presented in this subsection.

Document #: FCC Rules 47 CFR-2

Title: *Frequency Allocations and Radio Treaty Matters: General Rules and Regulations*

Key Word(s): Frequency Allocations, Treaty Matters

Effective Date: 1 October 1993

Revision Level: This document is revised at least once each calendar year.

Supersedence: NA

Applicability: The FCC rules are applicable to developers and users of the devices covered in the specific parts and subparts of the code.

Purpose: The purpose of this document is to identify the administrative steps necessary for obtaining ... authorization from the FCC for use of devices.

Comments: Part 2 provides the following information:
Subpart B - Table of frequency allocations
Subpart I - Marketing rules
Subpart J - Equipment authorization procedures
Subpart K - Importation rules.

Document #: FCC Rules 47 CFR-15

Title: *Radio Frequency Devices*

Key Word(s): RF Devices

Effective Date: 1 October 1993

Revision Level: This document is revised at least once each calendar year.

Supersedence: NA

Applicability: This code of federal regulations is applicable to developers and users of the devices covered in the specific codes.

Purpose: The purpose of this document is to provide required technical specifications and equipment authorization procedures to be followed in marketing incidental and restricted radiation devices.

Comments: Part 15 applies to the following devices:

- Incidental radiators (motors, power lines, and appliances)
- Unintentional radiators (computers, VCRs, receivers, modems)
- Intentional radiators (cordless telephones, baby monitors, wireless security systems, and intrusion detectors).

Document #: FCC Rules 47 CFR-18

Title: *Industrial, Scientific, and Medical (ISM) Equipment*

Key Word(s): ISM Equipment

Effective Date: 1 October 1993

Revision Level: This document is revised at least once each calendar year.

Supersedence: NA

Applicability: The FCC rules are applicable to developers and users of the devices covered in the specific parts and subparts of the code.

Purpose: The purpose of this document is to provide requirements for the technical specifications, and equipment authorization procedures for industrial, scientific and medical devices, which apply to the marketing of such devices.

Comments: Part 18 applies to the following devices:

- Induction Welders (below 2 MHz)
- Dielectric Heaters (10 to 100 MHz)
- Medical Diathermy (1-10 MHz, 27 MHz, 433 MHz)
- Food Processors (915 MHz)
- Microwave Oven (2450 MHz)

Document #: FCC Rules 47 CFR-21

Title: *Domestic Public Fixed Radio Services*

Key Word(s): Fixed Radio Services

Effective Date: 1 October 1993

Revision Level: This document is revised at least once each calendar year.

Supersedence: NA

Applicability: This part of the code of federal regulations is applicable to developers and users of equipment in the domestic radio services in the US.

Purpose: The purpose of this part of the code is to provide regulations for the use of land-mobile and point-to-point domestic public radio services.

Comments: None

Document #: FCC Rules 47 CFR-23

Title: *International Fixed Public Radio-Communications Services*

Key Word(s): Fixed Public Radio

Effective Date: 1 October 1993

Revision Level: This document is revised at least once each calendar year.

Supersedence: NA

Applicability: This part of the code is applicable to developers and users of international fixed public radio communications point-to-point services.

Purpose: The purpose of this part of the code is to provide regulations for the use of international fixed public radio-communications point-to-point services.

Comments: None

Document #: FCC Rules 47 CFR- 25

Title: *Satellite Communications*

Key Word(s): Satellite Communications

Effective Date: 1 October 1993

Revision Level: This document is revised at least once each calendar year.

Supersedence: NA

Applicability: This part of the code is applicable to developers and users of point-to-point satellite communications services.

Purpose: The purpose of this part of the code is to provide regulations for the use of point-to-point satellite communication services.

Comments: None

Document #: FCC Rules 47 CFR-73

Title: *Radio Broadcast Services*

Key Word(s): AM, FM, and TV

Effective Date: 1 October 1993

Revision Level: This document is revised at least once each calendar year.

Supersedence: NA

Applicability: This part of the code is applicable to developers and users of radio broadcast services.

Purpose: The purpose of this document is to provide regulations for the use of radio broadcast stations.

Comments: This part of the code covers AM, FM, and TV broadcast station regulations.

Document #: FCC Rules 47 CFR-80

Title: *Stations in the Maritime Services*

Key Word(s): Maritime Services

Effective Date: 1 October 1993

Revision Level: This document is revised at least once each calendar year.

Supersedence: NA

Applicability: This part of the code is applicable to developers and users of point-to-point stations in the maritime services.

Purpose: The purpose of this part of the code is to provide regulations for the use of stations in the maritime service.

Comments: None

Document #: FCC Rules 47 CFR-87

Title: *Aviation Services*

Key Word(s): Aviation Services

Effective Date: 1 October 1993

Revision Level: This document is revised at least once each calendar year.

Supersedence: NA

Applicability: This part of the code is applicable to developers and users of aeronautical-communications systems in the aviation services.

Purpose: The purpose of this part of the code is to provide regulations for the use of aeronautical-communications systems in the aviation services.

Comments: None

Document #: FCC Rules 47 CFR-90B

Title: *Public Safety Radio Services*

Key Word(s): Public Safety Radio Services

Effective Date: 1 October 1993

Revision Level: This document is revised at least once each calendar year.

Supersedence: NA

Applicability: This subpart of the code is applicable to developers and users of the land-mobile public-safety radio services.

Purpose: The purpose of this subpart of the code is to provide regulations for the use of equipment in the land-mobile public-safety radio services.

Comments: None

Document #: FCC Rules 47 CFR-90D

Title: *Industrial Radio Services*

Key Word(s): Land Mobile, Industrial Radio Services

Effective Date: 1 October 1993

Revision Level: This document is revised at least once each calendar year.

Supersedence: NA

Applicability: This subpart of the code is applicable to developers and users of the land-mobile industrial radio services.

Purpose: The purpose of this subpart of the code is to provide regulations for the use of equipment in the land-mobile industrial radio services.

Comments: None

Document #: FCC Rules 47 CFR-90E

Title: *Land Transportation Radio Services*

Key Word(s): Land Mobile, Land Transportation Radio Services

Effective Date: 1 October 1993

Revision Level: This document is revised at least once each calendar year.

Supersedence: NA

Applicability: This subpart of the code is applicable to developers and users of the land-mobile land-transportation radio services.

Purpose: The purpose of this subpart of the code is to provide regulations for the use of equipment in the land-mobile land-transportation radio services.

Comments: None

Document #: FCC/OET Bulletin No. 62

Title: *Understanding the FCC Regulations Concerning Computing Devices*

Key Word(s): Digital Devices, Computers

Effective Date: May 1984

Revision Level: Original May 1984

Supersedence: NA

Applicability: This document is applicable to users of digital devices in categorizing classes of equipment for FCC compliance.

Purpose: The purpose of this bulletin is to provide an understanding of FCC Part 15 rules to aid in identifying those devices that are subject to the FCC rules.

Comments: None

Document #: FCC/OST Bulletin No. 65

Title: *Evaluating Compliance with FCC-Specified Guidelines for Human Exposure to Radio Frequency Radiation*

Key Word(s): Radiation Hazards

Effective Date: October 1985

Revision Level: Original Oct 1985

Supersedence: NA

Applicability: This document is applicable for use in evaluating compliance with exposure guidelines for RF radiation established by the FCC.

Purpose: The purpose of this document is to provide methods to evaluate compliance with exposure guidelines for RF radiation specified by the FCC.

Comments: The FCC is currently planning to amend and update the guidelines and methods used for evaluating the environmental effects of RF radiation from FCC regulated facilities.

Document #: FCC/OST MP-4

Title: *FCC Methods of Measurement of Radio Noise Emissions from Computing Devices*

Key Word(s): Noise

Effective Date: December 1983

Revision Level: Original Dec 1983

Supersedence: NA

Applicability: The methods described in this document will be used by the FCC in testing computing systems, computing devices, and peripheral devices intended for use with computing devices. Applicants for certification of class B computing devices should employ these methods.

Purpose: The purpose of this document is to establish uniform methods of measuring radio noise emitted from computing devices defined in section 15.4 of FCC Rules (47 CFR Part 15J).

Comments: The FCC has amended Part 15 of its rules to permit the use of ANSI C63.4-1991 for compliance measurements on digital devices (formerly called computing devices).

Document #: FCC/OST MP-5

Title: *FCC Methods of Measurement of Radio Noise Emissions from Industrial, Scientific, and Medical Equipment*

Key Word(s): Medical Equipment, ISM

Effective Date: February 1986

Revision Level: Original Feb 1986

Supersedence: This document supersedes OCE Bulletins 20 and 39 and Test Procedure No. 2.

Applicability: This document is applicable to those applying for equipment certification and to parties seeking verification.

Purpose: The purpose of this document is to establish uniform methods of measuring radio noise emitted from ISM equipment as defined in 47 CFR paragraph 18.107 of the FCC rules.

Comments: None

6.4 FDA EMC-RELATED DOCUMENTS

Summaries of FDA EMC-related documents are presented in this subsection.

Document #: MDS-201-0004

Title: *Electromagnetic Compatibility Standard for Medical Devices*

Key Word(s): Medical Devices

Effective Date: 1 October 1979

Revision Level: Original 1 Oct 1979

Supersedence: NA

Applicability: This standard was prepared by the Food and Drug Administration and is applicable for voluntary use by manufacturers of medical devices.

Purpose: The purpose of this standard is to identify requirements for the emission levels and susceptibility of medical devices.

Comments: Efforts are underway to develop an international standard for electromagnetic compatibility of medical devices. A draft International Electrotechnical Commission (IEC) standard, IEC 601-1-2, Medical Electronic Equipment, has been prepared.

Document #: FDA Contract No. 223-74-5083

Title: *Labeling Requirements, Performance Requirements, and Terminology for Implantable Artificial Cardiac Pacemakers*

Key Word(s): Pacemakers

Effective Date: August 1975

Revision Level: Original Aug 1975

Supersedence: NA

Applicability: This standard is applicable for voluntary use by manufacturers of cardiac pacemakers.

Purpose: The propose of this standard is to provide labeling requirements, performance requirements, test methods, and terminology that will help establish a reasonable level of safety and efficacy for implantable cardiac pacemakers.

Comments: This standard was developed by the Pacemaker Standards Subcommittee of the Association for the Advancement of Medical Instrumentation (AAMI) under FDA Contract No. 223-74-5083 during the period from May 1974 through August 1975.

Document #: FDA Rules 21 CFR 1030

Title: *Performance Standards for Microwave and Radio Frequency Emitting Products*

Key Word(s): Microwave and RF Emitting Products

Effective Date: 1 April 1994

Revision Level: This document is revised at least once each calendar year.

Supersedence: NA

Applicability: The FDA rules are applicable to developers and users of the devices covered in the specific parts of the codes.

Purpose: The purpose of these standards is to provide labeling requirements, performance requirements, test methods, and terminology that will help establish a reasonable level of safety for RF emitting products.

Comments: Part 1030, paragraph 1030.10, covers microwave ovens.

Document #: FDA Rules 21 CFR 1040

Title: *Performance Standards for Light-Emitting Products*

Key Word(s): Light-Emitting Products

Effective Date: 1 April 1994

Revision Level: This document is revised at least once each calendar year.

Supersedence: NA

Applicability: The FDA rules are applicable to developers and users of the devices covered in the specific parts of the code.

Purpose: The purpose of these standards is to provide labeling requirements, performance requirements, test methods, and terminology that will help establish a reasonable level of safety for light-emitting products.

Comments: Part 1040 covers the following products:

- Section 1040.10 - Laser products
- Section 1040.11 - Specific purpose laser products
- Section 1040.20 - Sunlamp products and ultraviolet lamps intended for use in sunlamp products
- Section 1040.30 - High-intensity mercury vapor discharge lamps.

6.5 NTIA EMC-RELATED DOCUMENTS

Summaries of NTIA EMC-related documents are presented in this subsection.

Document #: NTIA Manual

Title: *Manual of Regulations and Procedures for Federal Radio Frequency Management*

Key Word(s): RF Management

Effective Date: January 1994

Revision Level: Under continual revision.

Supersedence: Manual by NTIA supersedes one by OTP.

Applicability: This manual applies to all federal agencies using the RF spectrum.

Purpose: The purpose of this manual relative to frequency management is illustrated by the chapter headings:

1. Authority and Organization
2. Telecommunications Policy
3. International Matters
4. Allocations, Allotments, and Plans
5. Spectrum Standards
6. Definitions and Particulars of Assignments
7. Authorized Frequency Usage
8. Procedures and Principles for the Assignment and Coordination of Frequencies
9. Preparation of Applications for Frequency Assignment Action
10. Procedures for the Review of Telecommunications Systems for Frequency Availability and Electromagnetic Compatibility (EMC)
11. Public Access to the Federal Spectrum Management Process.

Comments: None

Document #: FED-STD-1002A

Title: *Time and Frequency Information in Telecommunications Systems*

Key Word(s): Telecommunications Systems

Effective Date: 3 September 1991

Revision Level: Rev A 3 Sep 1991

Supersedence: NA

Applicability: This standard is applicable to all government agencies.

Purpose: The purpose of this standard is to provide requirements for time and frequency information in telecommunications systems.

Comments: None

Document #: FED-STD-1016

Title: *Analog to Digital Conversion of Radio Voice by 4800 bit/sec Code Excited Linear Prediction (CELP)*

Key Word(s): A/D Conversion, CELP

Effective Date: 14 February 1991

Revision Level: Original 14 Feb 1991

Supersedence: NA

Applicability: This standard is applicable to all government agencies.

Purpose: The purpose of this document is to provide requirements for analog to digital conversion of radio voice by 4800 bit/sec Code Excited Linear Prediction (CELP).

Comments: None

Document #: FED-STD-1023

Title: *Interoperability Requirements for Encrypted Digitized Voice Utilized with 25 kHz Channel FM Radios Operating Above 30 MHz*

Key Word(s): Encrypted Digitized Voice

Effective Date: 25 September 1989

Revision Level: Original 25 Sep 1989

Supersedence: NA

Applicability: This standard is applicable to all government agencies.

Purpose: The purpose of this standard is to provide interoperability requirements for encrypted, digitized voice utilized with 25-kHz channel FM radios operating above 30 MHz.

Comments: None

Document #: FED-STD-1035A

Title: *Coding, Modulation, and Transmission Requirements for Single Channel Medium and High Frequency Radiotelegraph Systems Used in Government Maritime Mobile Telecommunications*

Key Word(s): Radiotelegraph, Maritime Mobile Telecommunications

Effective Date: 10 May 1991

Revision Level: Rev A 10 May 1991

Supersedence: This standard is a revision of FED-STD-1035.

Applicability: This standard is applicable to all government agencies.

Purpose: The purpose of this standard is to provide coding, modulation, and transmission requirements for single-channel medium and high frequency radiotelegraph systems used in government maritime mobile telecommunications.

Comments: None

Document #: FED-STD-1037B

Title: *Telecommunications: Glossary of Telecommunications Terms*

Key Word(s): Glossary of Telecommunications Terms

Effective Date: 3 June 1991

Revision Level: Rev B 3 Jun 1991

Supersedence: FED-STD-1037B incorporates and supersedes FED-STD-1037A.

Applicability: The use of this standard by all Federal departments and agencies is mandatory.

Purpose: The purpose of this standard is to improve the Federal acquisition process by providing Federal departments and agencies with a comprehensive, authoritative source of definitions of terms used in telecommunications and directly related disciplines by national, international and US Government telecommunications specialists.

Comments: The US Department of Commerce, National Telecommunications and Information Administration, Institute for Telecommunications Sciences (NTIA/ITS), 325 Broadway, Boulder, CO 80303, supplied the chair and secretarial, technical, and editorial services for the subcommittee.

Document #: FED-STD-1045A

Title: *High Frequency (HF) Radio Automatic Link Establishment*

Key Word(s): HF, ALE

Effective Date: 18 October 1993

Revision Level: Rev A 18 Oct 1993

Supersedence: This standard is a revision of FED-STD-1045.

Applicability: This standard is applicable to all government agencies.

Purpose: The purpose of this standard is to provide the requirements for HF radio automatic link establishment.

Comments: FED STD-1045A is the federal version of MIL-STD-188-141A.

Document #: FED-STD-1046

Title: *HF Radio Automatic Networking Section 1: Basic Networking - ALE Controller*

Key Word(s): HF Radio, ALE Controller

Effective Date: 18 October 1993

Revision Level: Original 18 Oct 1993

Supersedence: NA

Applicability: This standard is applicable to all government agencies.

Purpose: The purpose of this standard is to provide requirements for HF radio automatic networking. Section 1 is basic networking - automatic link establishment (ALE) controller.

Comments: None

Document #: FED-STD-1049

Title: *HF Radio Automatic Operation in Stressed Environments, Section 1: Linking Protection*

Key Word(s): HF Radio, Stressed Environments

Effective Date: 26 July 1993

Revision Level: Original 26 Jul 1993

Supersedence: NA

Applicability: This standard is applicable to all government agencies.

Purpose: The purpose of this standard is to provide requirements for HF radio automatic operation in stressed environments Section 1: Linking Protection.

Comments: FED-STD-1049 is a common document with MIL-STD-187-721 and MIL-STD-187-110.

6.6 OSHA EMC-RELATED DOCUMENTS

Summaries of OSHA EMC-related documents are presented in this subsection.

Document #:	OSHA 29 CFR 1910.97
Title:	<i>Code of Federal Regulations Nonionizing Radiation Protection Guide</i>
Key Word(s):	Radiation Protection
Effective Date:	1 July 1993
Revision Level:	This document is revised at least once each calendar year.
Supersedence:	NA
Applicability:	The regulations for health and safety covered in this part of the code are applicable to all work environments under the purview of the US Department of Labor.
Purpose:	The purpose of these regulations is to provide criteria and instructions that, if followed, will ensure health and safety for employees covered under Department of Labor regulations.
Comments:	None

SECTION 7

VOLUNTARY EMC-RELATED DOCUMENTS

7.1 INTRODUCTION

The documents listed in this section were developed by voluntary, nongovernment standards organizations that play an important role in EMC. The documents include standards, recommended procedures, information reports, practices, reporting format test methods, definitions, and installation guides. Some of the documents in this section were developed as long as 20 years ago and are still in effect. Many of these older documents are still useful in helping to achieve EMC in new systems. Other types of documents require periodic revision to remain useful in EMC programs for newer systems. The more prominent organizations that develop EMC-related standardization documents are discussed in the following paragraphs. Summaries of EMC-related documents produced by these organizations are presented in the sections that follow. ANSI EMC-related documents are listed in Table 7-1 and described in Section 7.2. EIA EMC-related documents are listed in Table 7-2 and described in Section 7.3. IEEE EMC-related documents are listed in Table 7-3 and described in Section 7.4. RTCA EMC-related documents are listed in Table 7-4 and described in Section 7.5. SAE EMC-related documents are listed in Table 7-5 and described in Section 7.6.

7.1.1 American National Standards Institute (ANSI)

ANSI is a federation of industrial, trade, technical, labor, and professional organizations, government agencies, and consumer groups. The principal functions of ANSI are to coordinate the development of voluntary standards in the private sector and to provide national representation to international standardization organizations. Many ANSI standards in the areas of computers, data transmission, and information processing have been adopted by the federal government. ANSI C63 and ANSI C95 committees address EMI measurements and radiation hazards, respectively.

7.1.2 Electronic Industries Association (EIA)

The EIA is a nonprofit organization representing manufacturers of electronic products. The activities of EIA include the development of voluntary standards for electronic components, circuits, and equipment. Standardization activities of EIA are coordinated with ANSI and other organizations. Some of these activities, such as standardization in the area of digital interface circuits, directly impact government standards. EMC in the EIA is addressed in committee G-46.

7.1.3 Institute of Electrical and Electronics Engineers (IEEE)

The IEEE is a professional organization, and one of its activities is the development of voluntary standards in the area of communications-electronics with emphasis on measurement techniques and definitions of terms. Several IEEE standards have been used as a basis for developing communications standards in the MIL-STD-188 series of documents. EMC activity in the IEEE is addressed in committee S-27, the Electromagnetic Compatibility Society.

7.1.4 Radio Technical Commission for Aeronautics (RTCA)

RTCA is an association of government and industry aeronautical organizations in the US. Dedicated to the advancement of aeronautics, RTCA seeks sound technical solutions to problems involving the application of electronics and telecommunications to aeronautical operations. Its objective is the resolution of such problems by mutual agreement of its member organizations. The findings of RTCA are in the nature of recommendations to all organizations concerned.

7.1.5 Society of Automotive Engineers (SAE)

The SAE is a professional society of engineers in fields of self-propelled ground, flight, and space vehicles. Its objective is to promote design, construction, and utilization of self-propelled mechanisms, prime movers, components thereof, and related equipment. One of its publications is an annual handbook on standards. EMC issues within SAE are handled by SAE Committee AE4.

Table 7-1. ANSI EMC-Related Standards

ANSI C63.2-1987	<i>American National Standard Specifications for Electromagnetic Noise and Field Strength Instrumentation, 10 kHz to 40 GHz</i>
ANSI C63.4-1991	<i>American National Standards Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz</i>
ANSI C63.5-1988	<i>American National Standard for Electromagnetic Compatibility-Radiated Emission Measurements in Electromagnetic Interference (EMI) Control-Calibration of Antennas</i>
ANSI C63.6-1988	<i>American National Standard for Electromagnetic Compatibility-Open Area Test Site Measurements-Guide for the Computation of Errors</i>
ANSI C63.7-1992	<i>American National Standard Guide for Construction of Open Area Test Sites for Performing Radiated Emission Measurements</i>
ANSI C63.12-1987	<i>American National Standard Recommended Practice for Electromagnetic Compatibility Limits</i>
ANSI C63.13-1991	<i>American National Standard Guide on the Application and Evaluation of EMI Power Line Filters for Commercial Use</i>
ANSI C63.14-1992	<i>American National Standard Dictionary for Technologies of Electromagnetic Compatibility (EMC), Electromagnetic Pulse (EMP), and Electrostatic Discharge (ESD)</i>
ANSI C95.1-1992	<i>American National Standard Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz</i>
ANSI C95.2-1982	<i>American National Standard Radio-Frequency Radiation Hazard Warning Symbol</i>
ANSI C95.3-1991	<i>American National Standard Recommended Practice for the Measurement of Potentially--Hazardous Electromagnetic Fields - RF and Microwave</i>
ANSI C95.4-1981	<i>American National Standard Safety Guide for the Prevention of Radio Frequency Hazards to Electric Blasting Caps</i>
ANSI C95.5-1981	<i>American National Standard Recommended Practice for the Measurement of Hazardous Electromagnetic Fields-RF and Microwave</i>
ANSI Z136.1-1993	<i>American National Standard for the Safe Use of Lasers</i>

Table 7-2. EIA EMC-Related Standards

EIA/IS-16-A	<i>Immunity of Television Receivers and Video Cassette Recorders (VCRs) to Direct Radiation from Radio Transmissions 0.5 to 30 MHz</i>
EIA-152-C	<i>Minimum Standards for Land Mobile Communication FM or PM Transmitters 25 to 866 MHz</i>
EIA/TIA-204-D	<i>Minimum Standards for Land Mobile Communication FM or PM Receivers, 25 to 866 MHz</i>
EIA/TIA-316-C	<i>Minimum Standards for Portable/Personal Radio Transmitters, Receivers and Transmitter/Receiver Combination Land Mobile Communications FM or PM Equipment 25 to 1000 MHz</i>
EIA-361	<i>Feed-Through Radio Interference Capacitors-Paper, Film, and Paper/Film Dielectric</i>
EIA-378	<i>Measurement of Spurious Radiation from FM and TV Broadcast Receivers in the Frequency Range of 100 to 1000 MHz-Using the EIA-Laurel Broad-Band Antenna</i>
EIA-416	<i>Filters, Radio Interference</i>
EIA-450	<i>Standard Form for Reporting Measurements of Land Mobile, Base Station, and Portable/Personal Radio Receivers in Compliance with FCC Part 15 Rules</i>
EIA-471	<i>Symbol and Label for Electrostatic Sensitive Devices</i>

Table 7-3. IEEE EMC-Related Standards

IEEE 100-1992	<i>Standard Dictionary of Electrical and Electronics Terms, Fifth Edition</i>
IEEE 139-1988	<i>Recommended Practice for the Measurement of Radio Frequency Emission from Industrial Scientific and Medical (ISM) Equipment, Installed on Users Premises</i>
IEEE 140-1990	<i>Recommended Practice for Minimization of Interference from Radio-Frequency Heating Equipment</i>
IEEE 142-1991	<i>Recommended Practice for Grounding of Industrial and Commercial Power Systems (IEEE Green Book)</i>
IEEE 145-1993	<i>Standard Definitions of Grounding</i>
IEEE 187-1990	<i>Standard on Radio Receivers: Open Field Method of Measurement of Spurious Radiation from FM and Television Broadcast Receivers</i>
IEEE 213-1987	<i>Standard Procedure for Measuring Conducted Emissions in the Range of 300 kHz to 25 MHz from Television and FM Broadcast Receivers to Power Lines</i>
IEEE 260-1978	<i>Standard Letter Symbols for Units of Measurement (SI Units, Customary Inch-Pound Units and Certain Other Units)</i>
IEEE 291-1991	<i>Standard Methods for Measuring Electromagnetic Field Strength of Sinusoidal Continuous Waves, 30 Hz to 30 GHz</i>
IEEE 299-1991	<i>Standard for Measuring the Effectiveness of Electromagnetic Shielding Enclosures</i>
IEEE 376-1975	<i>Standard for the Measurement of Impulse Strength and Impulse Bandwidth</i>
IEEE 377-1991	<i>Recommended Practice for Measurement of Spurious Emission from Land-Mobile Communications Transmitters</i>
IEEE 430-1986	<i>Standard Procedures for the Measurement of Radio Noise from Overhead Power Lines and Substations</i>
IEEE 455-1985	<i>Standard Test Procedure for Measuring Longitudinal Balance of Telephone Equipment Operating in the Voice Band</i>
IEEE 469-1977	<i>Recommended Practice for Voice Frequency Electrical-Noise Tests of Distribution Transformers</i>
IEEE 473-1985	<i>Recommended Practice for an Electromagnetic Site Survey (10 kHz to 10 GHz)</i>
IEEE 475-1983	<i>Measurement Procedure for Field-Disturbance Sensor (RF Intrusion Alarm)</i>
IEEE 518-1982	<i>Guide for the Installation of Electrical Equipment to Minimize Noise Inputs to Controllers from External Sources</i>

Table 7-3. IEEE EMC-Related Standards - Continued

IEEE 521-1984	<i>Standard Letter Designations for Radar Frequency Bands</i>
IEEE 539-1990	<i>Standard Definitions of Terms Relating to Corona and Field Effects of Overhead Power Lines</i>
IEEE 644-1987	<i>Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines</i>
IEEE 686-1990	<i>Standard Radar Definitions</i>
IEEE 743-1984	<i>Standard Methods and Equipment for Measuring the Transmission Characteristics of Analog Voice Frequency Circuits</i>
IEEE 945-1984	<i>Recommended Practice for Preferred Metric Units for Use in Electrical and Electronics Science and Technology</i>

Table 7-4. RTCA EMC-Related Standards

DO-160C-89	<i>Environmental Conditions and Test Procedures for Airborne Equipment</i>
DO-163-76	<i>Minimum Performance Standards-High Frequency Radio Communications Transmitting and Receiving Equipment Operating Within the Radio Frequency Range of 1.5 to 30 MHz</i>
DO-176-81	<i>FM Broadcast Interference Related to Airborne ILS, VOR and VHF Communications</i>
DO-189-85	<i>Minimum Operational Performance Standards for Airborne Distance Measuring Equipment (DME) Operating in the Frequency Range of 960-1215 MHz</i>
DO-199-88 (Vol I & II)	<i>Potential Interference to Aircraft Electronic Equipment from Devices Carried Aboard</i>

Table 7-5. SAE EMC-Related Standards

AIR 1147	<i>EMI on Aircraft From Jet Engine Charging</i>
AIR 1208	<i>Bibliography-Lightning and Precipitation Static</i>
AIR 1209	<i>Construction and Calibration of Parallel-Plate Transmission Lines for EMI Susceptibility Testing</i>
AIR 1221	<i>EMC System Design Checklist</i>
AIR 1255	<i>Spectrum Analyzers for EMI Measurements</i>
AIR 1394	<i>Cabling Guidelines for Electromagnetic Compatibility</i>
AIR 1404	<i>DC Resistivity vs RF Impedance of EMI Gaskets</i>
AIR 1406	<i>Lightning Protection and Static Electrification</i>
AIR 1423	<i>Electromagnetic Compatibility on Gas Turbine Engines for Aircraft Propulsion</i>
AIR 1425	<i>Methods of Achieving Electromagnetic Compatibility of Gas Turbine Engine Accessories for Self-Propelled Vehicles</i>
AIR 1500	<i>Bibliography, Lossy Filters</i>
AIR 1509	<i>EMC Antennas and Antenna Factors: How to Use Them</i>
AIR 1662	<i>Minimization of Electrostatic Hazards in Aircraft Fuel Systems</i>
AIR 1700	<i>Transition Frequency: An Upper Frequency Measurement Boundary for Evaluation of Shielding Effectiveness in Cylindrical Systems</i>
AIR 4079 (in Draft)	<i>Procedure for Digitized Method of Spark Energy Measurement</i>
ARP 935	<i>Suggested EMI Control Plan Outline</i>
ARP 936A	<i>Capacitor, 10 mF for EMI Measurements</i>
ARP 958A	<i>Broadband EMI Measurement Antennas, Standard Calibration Requirements and Methods</i>
ARP 1172	<i>Filters, Conventional, EMI Reduction, Specifications for</i>

Table 7-5. SAE EMC-Related Standards - Continued

ARP 1173	<i>Test Procedures to Measure the RF Shielding Characteristics of EMI Gaskets</i>
ARP 1267	<i>EMI Measurements of Impulse Generators, Standard Calibration Requirements and Techniques</i>
ARP 1481	<i>Corrosion Control and Electrical Conductivity in Enclosure Design</i>
ARP 1705	<i>Coaxial Test Procedure to Measure the RF Shielding Characteristics of EMC Gasket Materials</i>
ARP 1870	<i>Aerospace Systems Electrical Bonding and Grounding for Electromagnetic Compatibility and Safety</i>
ARP 1972	<i>Recommended Measurement Practices and Procedures for EMC Testing</i>
ARP 4043	<i>Flightline Bonding and Grounding of Aircraft</i>
ARP 4242 (Draft)	<i>Electromagnetic Compatibility Control Requirements, Systems</i>
ARP 4244 (Draft)	<i>Recommended Insertion Loss Test Methods for EMI Power Line Filters</i>
J 551-90	<i>Performance Levels and Methods of Measurement of Electromagnetic Radiation From Vehicles and Devices (30 to 1000 MHz) Standard</i>
J 1113-87	<i>Electromagnetic Susceptibility Measurement Procedures for Vehicle Components (Except Aircraft), Recommended Practice</i>
J 1338-81	<i>Open-Field Whole Vehicle Radiated Susceptibility, 10 kHz-18 GHz, Electric Field. Information Report</i>
J 1448-84	<i>Electromagnetic Susceptibility Measurements of Vehicle Components Using TEM Cells (14 kHz-200 MHz). Information Report</i>
J 1547-88	<i>Electromagnetic Susceptibility Procedures for Common Mode Injection (1-400 MHz), Module Testing. Information Report</i>
J 1812-88	<i>Function Performance Status Classification for EMC Susceptibility Testing of Automotive Electronic and Electrical Devices. (Information Report)</i>

7.2 ANSI EMC-RELATED STANDARDS

Summaries of ANSI EMC-related standards are presented in this subsection.

Document #:	ANSI C63.2-1987		
Title:	<i>American National Standard Specifications for Electromagnetic Noise and Field Strength Instrumentation, 10 kHz to 40 GHz</i>		
Key Word(s):	Electromagnetic Noise, Field Strength Instrumentation		
Effective Date:	1987		
Revision Level:	Update	1987	
	Update	1980	
	Original	1963	
Supersedence:	NA		
Applicability:	This document is applicable to government and industry and is copyrighted by IEEE.		
Purpose:	The purpose of this standard is to delineate requirements of EM-noise instrumentation for the frequency range of 10 kHz to 40 GHz incorporating quasi-peak, peak, rms, and average detectors. The recommended measurement configuration includes a frequency-selective voltmeter with appropriate coupling devices (antennas and current probes).		
Comments:	This revision extended the upper frequency range from 1 to 40 GHz.		

Document #:	ANSI C63.4-1991		
Title:	<i>American National Standards Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz</i>		
Key Word(s):	Radio-Noise Emissions, Low-Voltage Electrical Equipment		
Effective Date:	1991		
Revision Level:	Update	1991	
	Update	1988	
	Update	1981	
	Original	1963	
Supersedence:	NA		
Applicability:	This document is copyrighted by IEEE and is applicable for voluntary use by government and industry.		
Purpose:	The purpose of this standard is to establish uniform methods of measuring radio noise emitted from low-voltage electrical and electronic equipment in the frequency range of 9 kHz to 40 GHz. Methods for the measurement of radiated and power line conducted radio noise are covered and apply to the measurement of individual components, units, or systems.		
Comments:	This revision extended the upper frequency range from 1 to 40 GHz.		

Document #: ANSI C63.5-1988

Title: *American National Standard for Electromagnetic Compatibility-Radiated Emission Measurements in Electromagnetic Interference (EMI) Control-Calibration of Antennas*

Key Word(s): Radiated Emission Measurements, Calibration of Antennas

Effective Date: 16 June 1988

Revision Level: Original 16 Jun 1988

Supersedence: NA

Applicability: This document is copyrighted by the IEEE and is applicable for voluntary use by government and ... industry.

Purpose: The purpose of this standard is to provide procedures for radiated EMI measurements and calibration of test antennas.

Comments: None

Document #: ANSI C63.6-1988

Title: *American National Standard for Electromagnetic Compatibility-Open Area Test Site Measurements-Guide for the Computation of Errors*

Key Word(s): Open Area Test Site Measurements

Effective Date: 1988

Revision Level: Original 1988

Supersedence: NA

Applicability: This document is copyrighted by IEEE and is applicable for voluntary use by government and industry.

Purpose: The purpose of this standard is to provide a procedure for open area test site measurements and a guide for the computation of errors.

Comments: None

Document #: ANSI C63.7-1992

Title: *American National Standard Guide for Construction of Open Area Test Sites for Performing Radiated Emission Measurements*

Key Word(s): Open Area Test Sites

Effective Date: 1992

Revision Level: Update 1992
Original 1988

Supersedence: NA

Applicability: This document is copyrighted by IEEE and is applicable for voluntary use by government and industry.

Purpose: The purpose of this standard is to provide guidelines for construction of open area test sites for performing radiated emission measurements.

Comments: None

Document #: ANSI C63.12-1987

Title: *American National Standard Recommended Practice for Electromagnetic Compatibility Limits*

Key Word(s): Electromagnetic Compatibility Limits

Effective Date: 1987

Revision Level: Update 1987
Original 1984

Supersedence: NA

Applicability: This document is copyrighted by IEEE and used by government and industry.

Purpose: This purpose of this standard is to:

- Discuss the general properties of environmental radio noise of both man-made and natural origin.
- Identify appropriate measurement devices.
- Discuss the rationale that can be used in selecting a consistent set of limits.
- Provide a suggested set of limits for general application.

Comments: None

Document #: ANSI C63.13-1991

Title: *American National Standard Guide on the Application and Evaluation of EMI Power Line Filters for Commercial Use*

Key Word(s): Power Line Filters

Effective Date: 1991

Revision Level: Original 1991

Supersedence: NA

Applicability: This document is copyrighted by IEEE and is applicable for voluntary use by government and industry.

Purpose: The purpose of this standard is to provide a guide for the application and evaluation of EMI power line filters for commercial use.

Comments: None

Document #: ANSI C63.14-1992

Title: *American National Standard Dictionary for Technologies of Electromagnetic Compatibility (EMC), Electromagnetic Pulse (EMP), and Electrostatic Discharge (ESD)*

Key Word(s): EMC, EMP, ESD

Effective Date: 1992

Revision Level: Original 1992

Supersedence: This standard supersedes MIL-STD-463A Notice 1, *Definitions and System of Units, Electromagnetic Interference and Electromagnetic Compatibility Technology*.

Applicability: This standard is applicable for use by government and industry.

Purpose: The purpose of this standard is to provide a dictionary of terms for technologies of EMC, EMP, and ESD.

Comments: None

Document #: ANSI C95.1-1992

Title: *American National Standard Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz*

Key Word(s): Human Exposure to RF Electromagnetic Fields

Effective Date: 18 November 1992

Revision Level: Update 18 Nov 1992
Original 1974

Supersedence: NA

Applicability: This document is applicable to government and industry and is published by the IEEE.

Purpose: The purpose of this standard is to provide recommendations for criteria that, if followed, will prevent harmful effects to human beings exposed to EM radiation from 3 kHz to 300 GHz. These recommendations do not apply to the deliberate exposure of patients by practitioners of the healing arts.

Comments: This document was approved by the IEEE on 26 September 1991 and published by IEEE as IEEE C95.1-1991 on 27 April 1992. The standard was adopted by ANSI with the 18 November 1992 update.

Document #: ANSI C95.2-1982

Title: *American National Standard Radio-Frequency Radiation Hazard Warning Symbol*

Key Word(s): RF Radiation Hazard Warning Symbol

Effective Date: 1982

Revision Level: Reaffirmed 1988
Update 1982
Update 1974
Original 1966

Supersedence: NA

Applicability: The standard was adopted by DoD on 28 June 1967.

Purpose: The purpose of this document is to provide a symbol for use as a sign intended to warn workers or the public of the presence of biologically hazardous levels of electromagnetic radiation and, insofar as considered desirable, to define specific hazards and provide cautionary information.

Comments: None

Document #: ANSI C95.3-1991

Title: *American National Standard Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave*

Key Word(s): Electromagnetic Fields Measurement

Effective Date: 21 August 1991

Revision Level: Update 21 Aug 1991
Original 1981

Supersedence: This document supersedes IEEE/ANSI C95.5-1981.

Applicability: This document is copyrighted by IEEE and was adopted by DoD on 20 November 1972.

Purpose: The purpose of this document is to establish specifications for techniques and instrumentation to be used in evaluating RF hazards to personnel. Emphasis is on techniques for measuring power density at microwave frequencies and are generally applicable only in the far field.

Comments: None

Document #: ANSI C95.4-1981

Title: *American National Standard Safety Guide for the Prevention of Radio Frequency Hazards to Electric Blasting Caps*

Key Word(s): HERO

Effective Date: September 1981

Revision Level: Original Sep 1981

Supersedence: This document is a reprint of Instrument Makers of Explosives Publication No. 20.

Applicability: This document applies solely to commercial electric blasting caps manufactured in the US and does not apply to military electric firing devices.

Purpose: The purpose of this document is to provide a basis for assessing the hazards associated with initiation of commercial electric blasting caps by RF energy by indicating safe separation distances from commercial RF sources.

Comments: This publication has been approved as a guide by American National Standards Committee C95 on Radio-Frequency Radiation Hazards.

Document #: ANSI C95.5-1981

Title: *American National Standard Recommended Practice for the Measurement of Hazardous Electromagnetic Fields-RF and Microwave*

Key Word(s): Hazardous Electromagnetic Fields

Effective Date: 16 March 1981

Revision Level: Original 16 Mar 1981

Supersedence: NA

Applicability: This standard is applicable for government and industry use.

Purpose: The purpose of this recommended practice is to specify techniques and instrumentation for the measurement of potentially hazardous electromagnetic fields both in the near and far field of the source.

Comments: More information on this subject is available in ANSI C95.3-1991.

Document #: ANSI Z136.1-1993

Title: *American National Standard for the Safe Use of Lasers*

Key Word(s): Lasers

Effective Date: 1993

Revision Level: This standard is a revision of ANSI Z136.1-1986.

Supersedence: NA

Applicability: This standard was adopted by DoD on 6 June 1980. It was copyrighted by IEEE, and is applicable for government and industry use.

Purpose: The purpose of this standard is to provide reasonable and accurate guidance for the safe use of lasers and laser systems with output wavelengths between 0.2 μm and 1 mm.

Comments: None

7.3 EIA EMC-RELATED STANDARDS

Summaries of EIA EMC-related standards are presented in the following subsection.

Document #: EIA/IS-16-A

Title: *Immunity of Television Receivers and Video Cassette Recorders (VCRs) to Direct Radiation from Radio Transmissions 0.5 to 30 MHz*

Key Word(s): TV, Video Cassette Recorders, VCR

Effective Date: 1987

Revision Level: Original 1987

Supersedence: NA

Applicability: This standard is applicable for government and industry use.

Purpose: The purpose of this standard is to define the levels at which receivers and video cassette recorders (VCRs) must be immune to direct radiation from radio transmissions over the 0.5 to 30 MHz frequency band.

Comments: None

Document #: EIA-152-C

Title: *Minimum Standards for Land Mobile Communication FM or PM Transmitters 25 to 866 MHz*

Key Word(s): Land Mobile

Effective Date: 1988

Revision Level: Rev C 1988
Rev B 1970

Supersedence: NA

Applicability: This standard is applicable for government and industry use.

Purpose: The purpose of this standard is to detail definitions and methods for measurement of the characteristics of FM or PM land-mobile transmitters in fixed and vehicular installations. The standard is intended to promote compatibility of these transmitters with systems in which they operate.

Comments: None

Document #: EIA/TIA-204-D

Title: *Minimum Standards for Land Mobile Communication FM or PM Receivers, 25 to 866 MHz*

Key Word(s): Land Mobile

Effective Date: 1989

Revision Level: Rev D 1989

Supersedence: This standard supersedes EIA/TIA-204-C.

Applicability: This standard is applicable for government and industry use.

Purpose: The purpose of this document is to detail definitions and methods for measurement of the characteristics of FM or PM land-mobile receivers in fixed vehicular installations.

Comments: None

Document #: EIA/TIA-316-C

Title: *Minimum Standards for Portable/Personal Radio Transmitters, Receivers and Transmitter/Receiver Combination Land Mobile Communications FM or PM Equipment 25 to 1000 MHz*

Key Word(s): Land Mobile

Effective Date: 1990

Revision Level: Rev C 1990
Rev B 1979

Supersedence: NA

Applicability: This standard is applicable for government and industry use.

Purpose: The purpose of this standard is to detail minimum performance requirements for FM or PM portable/personal radio transmitters, receivers, or combinations of both, which can be hand-carried or worn on the person, and which operate from their own portable power source and antenna.

Comments: None

Document #: EIA-361

Title: *Feed-Through Radio Interference Capacitors-Paper, Film, and Paper/Film Dielectric*

Key Word(s): Capacitors

Effective Date: 1980

Revision Level: Reaffirmed 1990
Original 1980

Supersedence: NA

Applicability: This standard is applicable for government and industry use.

Purpose: The purpose of this standard is to cover general requirements for ac and dc paper, film and paper-film/dielectric and feed-through capacitors for both foil and metal types, hermetically sealed in metal cases, used primarily in broadband RFI suppression.

Comments: None

Document #: EIA-378

Title: *Measurement of Spurious Radiation from FM and TV Broadcast Receivers in the Frequency-Range of 100 to 1000 MHz-Using the EIA-Laurel Broad-Band Antenna*

Key Word(s): FM Broadcast Receivers, TV Broadcast Receivers

Effective Date: 1970

Revision Level: Original 1970

Supersedence: NA

Applicability: This standard is applicable for government and industry use.

Purpose: The purpose of this standard is to describe the sources of spurious radiation from FM and TV broadcast receivers and to set up methods of measurement whereby the strength of these radiations may be determined.

Comments: None

Document #: EIA-416

Title: *Filters, Radio Interference*

Key Word(s): Radio Interference Filters

Effective Date: 1974

Revision Level: Reaffirmed Mar 1981
Original 1974

Supersedence: NA

Applicability: This standard is applicable for government and industry use.

Purpose: The purpose of this standard is to cover the general requirements for current-carrying filters, ac and dc, for use primarily in the reduction of broadband radio interference.

Comments: None

Document #: EIA-450

Title: *Standard Form for Reporting Measurements of Land Mobile, Base Station, and Portable/Personal Radio Receivers in Compliance with FCC Part 15 Rules*

Key Word(s): Land Mobile

Effective Date: 1978

Revision Level: Original 1978

Supersedence: NA

Applicability: This standard is applicable for government and industry use.

Purpose: The purpose of this standard is to provide a standard reporting form as suggested by the FCC. The standard provides a uniform method of making and reporting the measurements identified in the title. The form supplements FCC Part 15 rules and must be used in conjunction with them.

Comments: None

Document #: EIA-471

Title: *Symbol and Label for Electrostatic Sensitive Devices*

Key Word(s): Electrostatic Sensitive Devices, ESD

Effective Date: 1980

Revision Level: Reaffirmed 1988
Original 1980

Supersedence: NA

Applicability: This standard is applicable for government and industry users engaged in handling semiconductor devices.

Purpose: The purpose of this standard is to provide a symbol and label for marking electrostatic sensitive devices that are subject to permanent damage due to electrostatic potentials.

Comments: None

7.4 IEEE EMC-RELATED STANDARDS

Summaries of IEEE EMC-related standards are presented in the following subsection.

Document #:	IEEE 100-1992		
Title:	<i>Standard Dictionary of Electrical and Electronics Terms, Fifth Edition</i>		
Key Word(s):	Electrical Terms, Electronics Terms		
Effective Date:	1992		
Revision Level:	Update	1992	
	Original	1988	
Supersedence:	NA		
Applicability:	This document is applicable for US government and industry.		
Purpose:	The purpose of this document is to provide standard definitions of electrical and electronics terms for all users of this information.		
Comments:	None		

Document #:	IEEE 139-1988		
Title:	<i>Recommended Practice for the Measurement of Radio Frequency Emission from Industrial Scientific and Medical (ISM) Equipment, Installed on Users Premises</i>		
Key Word(s):	RF Emissions, ISM		
Effective Date:	1988		
Revision Level:	Reaffirmed	1993	
	Update	1988	
	Original	1970	
Supersedence:	The 1988 version superseded the original issue dated 1970.		
Applicability:	The document is applicable to manufacturers and users of ISM equipment.		
Purpose:	The purpose of this document is to provide recommended standard procedures for measurement of RF emissions from ISM equipment.		
Comments:	None		

Document #: IEEE 140-1990

Title: *Recommended Practice for Minimization of Interference from Radio-Frequency Heating Equipment*

Key Word(s): RF Heating Equipment

Effective Date: 1990

Revision Level: Update 1990
Original 1950

Supersedence: NA

Applicability: This document is applicable to users of RF heating equipment.

Purpose: The purpose of this document is to recommend the formulation of good engineering practices where interference from RF may be encountered. The theoretical aspects of the interference problem are reviewed and procedures to be followed are outlined.

Comments: None

Document #: IEEE 142-1991

Title: *Recommended Practice for Grounding of Industrial and Commercial Power Systems (IEEE Green Book)*

Key Word(s): Grounding

Effective Date: May 1993

Revision Level: Update May 1993 (Correction Sheet)
Update 1991
Original 1982

Supersedence: NA

Applicability: This document is applicable to manufacturers and installers of industrial and commercial power systems.

Purpose: The purpose of this document is to recommend good practices for grounding of industrial and commercial power systems.

Comments: None

Document #: IEEE 145-1993

Title: *Standard Definitions of Grounding*

Key Word(s): Grounding

Effective Date: 1993

Revision Level: Update 1993
Original 1983

Supersedence: NA

Applicability: This document is applicable to designers, manufacturers and users of antennas.

Purpose: The purpose of this document is to provide standard definitions of terms for designers, manufacturers, and users of antennas.

Comments: None

Document #: IEEE 187-1990

Title: *Standard on Radio Receivers: Open Field Method of Measurement of Spurious Radiation from FM and Television Broadcast Receivers*

Key Word(s): FM Broadcast Receivers, TV Broadcast Receivers

Effective Date: 1990

Revision Level: Update 1990
Original 1951

Supersedence: NA

Applicability: This document is applicable for use by those agencies responsible for ensuring that spurious radiations from FM and TV receivers are kept to acceptable levels.

Purpose: The purpose of this document is to provide standard procedures for measurement of spurious emissions from FM and TV receivers.

Comments: None

Document #: IEEE 213-1987

Title: *Standard Procedure for Measuring Conducted Emissions in the Range of 300 kHz to 25 MHz from Television and FM Broadcast Receivers to Power Lines*

Key Word(s): FM Broadcast Receivers, TV Broadcast Receivers

Effective Date: 1987

Revision Level:	Reaffirmed	1993
	Update	1987
	Original	1974

Supersedence: The 1987 version of this document is an update of the 1974 version with a new title.

Applicability: This document is applicable for use by agencies concerned with power-line conducted interference from FM and TV receivers.

Purpose: The purpose of this document is to define a method for obtaining a measure of power-line conducted interference from FM and TV broadcast receivers operating between 300 kHz and 25 MHz.

Comments: None

Document #: IEEE 260-1978

Title: *Standard Letter Symbols for Units of Measurement (SI Units, Customary Inch-Pound Units and Certain Other Units)*

Key Word(s): Units of Measurement Symbols

Effective Date: 1978

Revision Level:	Reaffirmed	1991
	Original	1978

Supersedence: NA

Applicability: This document is applicable for use by government and industry.

Purpose: The purpose of this document is to provide standard symbols for units of measurement.

Comments: Refer to IEEE 260.1 and IEEE 260.3 (both revised in 1993) for other standard symbols and mathematical signs. IEEE 260-1991 is approved by ANSI and has been adopted by DoD.

Document #: IEEE 291-1991

Title: *Standard Methods for Measuring Electromagnetic Field Strength of Sinusoidal Continuous Waves, 30 Hz to 30 GHz*

Key Word(s): Continuous Waves

Effective Date: 1991

Revision Level: Original 1991

Supersedence: This standard is a revision and redesignation of IEEE Standard IEEE 284-1968 and IEEE Standard IEEE 302-1969.

Applicability: This document is applicable for use by government and industry.

Purpose: The purpose of this document is to provide standard methods for measuring field strength of sinusoidal continuous waves, 30 Hz to 30 GHz.

Comments: None

Document #: IEEE 299-1991

Title: *Standard for Measuring the Effectiveness of Electromagnetic Shielding Enclosures*

Key Word(s): Shielding

Effective Date: 1991

Revision Level: This document is a revision of IEEE interim standard 299, dated 1969.

Supersedence: NA

Applicability: This document is applicable for use by government and industry.

Purpose: The purpose of this document is to provide standard practices for measuring the effectiveness of shielding enclosures.

Comments: The procedures in this standard have been coordinated with MIL-STD-285.

Document #: IEEE 376-1975

Title: *Standard for the Measurement of Impulse Strength and Impulse Bandwidth*

Key Word(s): Impulse Strength, Impulse Bandwidth

Effective Date: 1975

Revision Level: Reaffirmed 1993
Original 1975

Supersedence: NA

Applicability: This document is applicable for use by government and industry.

Purpose: The purpose of this document is to provide a standard practice for measuring impulse strength and impulse bandwidth.

Comments: None

Document #: IEEE 377-1991

Title: *Recommended Practice for Measurement of Spurious Emission from Land-Mobile Communications Transmitters*

Key Word(s): Land Mobile

Effective Date: 1980

Revision Level: Reaffirmed 1991
Original 1980

Supersedence: NA

Applicability: This document is applicable for use by government and industry.

Purpose: The purpose of this document is to provide a standard practice for the measurement of spurious emissions from land-mobile communications transmitters.

Comments: None

Document #: IEEE 430-1986

Title: *Standard Procedures for the Measurement of Radio Noise from Overhead Power Lines and Substations*

Key Word(s): Power Lines

Effective Date: 1986

Revision Level: Reaffirmed 1991
Original 1986

Supersedence: NA

Applicability: This document is applicable for use by government and industry.

Purpose: The purpose of this document is to provide standard procedures for the measurement of radio noise from overhead power lines and substations.

Comments: None

Document #: IEEE 455-1985

Title: *Standard Test Procedure for Measuring Longitudinal Balance of Telephone Equipment Operating in the Voice Band*

Key Word(s): Telephone Equipment

Effective Date: 1985

Revision Level: Reaffirmed 1992
Original 1985

Supersedence: NA

Applicability: This document is applicable for use by government and industry.

Purpose: The purpose of this document is to provide a standard test procedure for measuring longitudinal balance of telephone equipment operating in the voice band.

Comments: None

Document #: IEEE 469-1977

Title: *Recommended Practice for Voice Frequency Electrical-Noise Tests of Distribution Transformers*

Key Word(s): Distribution Transformers, Transformers

Effective Date: 1977

Revision Level: Reaffirmed 1988
Original 1977

Supersedence: NA

Applicability: This document is applicable for use by government and industry.

Purpose: The purpose of this document is to provide a recommended practice for voice frequency electrical-noise tests of distribution transformers.

Comments: None

Document #: IEEE 473-1985

Title: *Recommended Practice for an Electromagnetic Site Survey (10 kHz to 10 GHz)*

Key Word(s): Site Survey

Effective Date: 1985

Revision Level: Reaffirmed 1991
Original 1985

Supersedence: NA

Applicability: This document is applicable for use by government and industry.

Purpose: The purpose of this document is to provide a recommended practice for an electromagnetic site survey as part of the planning for installation of communications/electronics systems.

Comments: None

Document #: IEEE 475-1983

Title: *Measurement Procedure for Field-Disturbance Sensor (RF Intrusion Alarm)*

Key Word(s): RF Intrusion Alarm

Effective Date: 1983

Revision Level: Original 1983

Supersedence: NA

Applicability: This document is applicable for use by government and industry.

Purpose: The purpose of this document is to provide a measurement procedure for field disturbance sensors.

Comments: None

Document #: IEEE 518-1982

Title: *Guide for the Installation of Electrical Equipment to Minimize Noise Inputs to Controllers from External Sources*

Key Word(s): Installation of Electrical Equipment

Effective Date: 1982

Revision Level: Reaffirmed 1990
Original 1982

Supersedence: NA

Applicability: This document is applicable for government and industry.

Purpose: The purpose of this document is to provide a guide for installation of electrical equipment to minimize noise inputs to controllers from external sources.

Comments: None

Document #: IEEE 521-1984

Title: *Standard Letter Designations for Radar Frequency Bands*

Key Word(s): Radar

Effective Date: 1984

Revision Level: Reaffirmed 1990
Original 1984

Supersedence: NA

Applicability: This document is applicable for users of radar in government and industry.

Purpose: The purpose of this document is to standardize letter designations for radar frequency bands.

Comments: None

Document #: IEEE 539-1990

Title: *Standard Definitions of Terms Relating to Corona and Field Effects of Overhead Power Lines*

Key Word(s): Power Lines

Effective Date: 1990

Revision Level: Update 1990
Original 1979

Supersedence: NA

Applicability: This document is applicable for government and industry power system analysis.

Purpose: The purpose of this document is to provide standard definitions of terms relating to power distribution systems.

Comments: None

Document #: IEEE 644-1987

Title: *Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines*

Key Word(s): Power Lines

Effective Date: 1987

Revision Level: Update 1987
Original 1979

Supersedence: NA

Applicability: This document is applicable for government and industry power system analysis.

Purpose: The purpose of this document is to provide procedures for measurement of power frequency electric and magnetic fields from AC power lines.

Comments: This document has been withdrawn. A replacement standard is being prepared, but is not available at this time.

Document #: IEEE 686-1990

Title: *Standard Radar Definitions*

Key Word(s): Radar

Effective Date: 1990

Revision Level: Original 1990

Supersedence: NA

Applicability: This document is applicable for government and industry users of radar systems.

Purpose: The purpose of this document is to provide standard definitions for radar applications in government and industry.

Comments: None

Document #: IEEE 743-1984

Title: *Standard Methods and Equipment for Measuring the Transmission Characteristics of Analog Voice Frequency Circuits*

Key Word(s): Analog Voice

Effective Date: 1984

Revision Level: Reaffirmed 1992
Original 1984

Supersedence: NA

Applicability: This document is applicable for use by government and industry.

Purpose: The purpose of this document is to recommend standard methods and equipment for measuring the transmission characteristics of analog voice frequency circuits.

Comments: None

Document #: IEEE 945-1984

Title: *Recommended Practice for Preferred Metric Units for Use in Electrical and Electronics Science and Technology*

Key Word(s): Metric Units

Effective Date: 1984

Revision Level: Reaffirmed 1992
Original 1984

Supersedence: NA

Applicability: This document is applicable for use by government and industry.

Purpose: The purpose of this document is to recommend preferred metric units for use in electrical and electronics science and technology.

Comments: None

7.5 RTCA EMC-RELATED DOCUMENTS

Summaries of RTCA EMC-related documents are presented in the following subsection.

Document #:	DO-160C-89
Title:	<i>Environmental Conditions and Test Procedures for Airborne Equipment</i>
Key Word(s):	Airborne Equipment
Effective Date:	13 May 1993
Revision Level:	Change 3 13 May 1993 Change 2 19 Jun 1992 Errata 15 Nov 1990 Change 1 27 Sep 1990 Original 1989
Supersedence:	NA
Applicability:	This document is applicable for government and industry use.
Purpose:	The purpose of this document is to establish a series of standard environmental test conditions, including the electromagnetic environment, and applicable test procedures for airborne equipment. The purpose of these tests is to provide a laboratory means of determining the performance characteristics of the equipment under environmental conditions representative of those that may be encountered during field operation of the equipment.
Comments:	Section 20 of this document addresses RF susceptibility (radiated and conducted).

Document #:	DO-163-76
Title:	<i>Minimum Performance Standards-High Frequency Radio Communications Transmitting and Receiving Equipment Operating Within the Radio Frequency Range of 1.5 to 30 MHz</i>
Key Word(s):	HF Radio
Effective Date:	2 November 1978
Revision Level:	Errata 2 Nov 1978 Original 1976
Supersedence:	NA
Applicability:	This document is applicable for government and industry use.
Purpose:	The purpose of this document is to provide minimum performance standards for high frequency radio equipment.
Comments:	None

Document #: DO-176-81

Title: *FM Broadcast Interference Related to Airborne ILS, VOR and VHF Communications*

Key Word(s): FM Broadcast Interference

Effective Date: July 1984

Revision Level: Errata Jul 1984
Original 1981

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide information on FM broadcast interference related to airborne ILS, VOR and VHF communications.

Comments: None

Document #: DO-189-85

Title: *Minimum Operational Performance Standards for Airborne Distance Measuring Equipment (DME) Operating in the Frequency Range of 960-1215 MHz*

Key Word(s): Airborne Distance Measuring Equipment, DME

Effective Date: 1985

Revision Level: Original 1985

Supersedence: This document supersedes DO-141 and DO-151A.

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide minimum performance standards for distance measurement equipment.

Comments: None

Document #: DO-199-88 (Vols I and II)

Title: *Potential Interference to Aircraft Electronic Equipment from Devices Carried Aboard*

Key Word(s): Aircraft Electronic Equipment

Effective Date: 1988

Revision Level: Original 1988

Supersedence: This document supersedes DO-119-1963.

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to identify and discuss potential interference to aircraft electronic equipment from devices carried aboard.

Comments: None

7.6 SAE EMC-RELATED DOCUMENTS

Summaries of SAE EMC-related documents are presented in the following subsection.

Document #: AIR 1147

Title: *EMI on Aircraft From Jet Engine Charging*

Key Word(s): Jet Engine Charging

Effective Date: 1970

Revision Level: Original 1970

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to recommend an approach for reducing aircraft EMI resulting from jet engine charging.

Comments: None

Document #: AIR 1208

Title: *Bibliography-Lightning and Precipitation Static*

Key Word(s): Lightning, Rain

Effective Date: 1973

Revision Level: Original 1973

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide a bibliography of information on the effects of lightning and precipitation static on aircraft.

Comments: None

Document #: AIR 1209

Title: *Construction and Calibration of Parallel-Plate Transmission Lines for EMI Susceptibility Testing*

Key Word(s): Parallel-Plate Transmission Lines, Transmission Lines

Effective Date: 1974

Revision Level: Original 1974

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide guidance for construction and calibration of parallel-plate transmission lines for EMI susceptibility testing.

Comments: None

Document #: AIR 1221

Title: *EMC System Design Checklist*

Key Word(s): EMC System Design Checklist

Effective Date: 1971

Revision Level: Original 1971

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide a checklist for use by project personnel to assure that factors required for adequate system EMC are considered and incorporated into a program.

Comments: None

Document #: AIR 1255

Title: *Spectrum Analyzers for EMI Measurements*

Key Word(s): Spectrum Analyzers

Effective Date: 1971

Revision Level: Original 1971

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide information on the characteristics of spectrum analyzers used for EMI measurements.

Comments: None

Document #: AIR 1394

Title: *Cabling Guidelines for Electromagnetic Compatibility*

Key Word(s): Cabling Guidelines

Effective Date: 1978

Revision Level: Original 1978

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide cabling guidelines for electromagnetic compatibility.

Comments: None

Document #: AIR 1404

Title: *DC Resistivity vs RF Impedance of EMI Gaskets*

Key Word(s): DC Resistivity

Effective Date: 1976

Revision Level: Original 1976

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide information on DC resistivity vs RF impedance of EMI gaskets.

Comments: None

Document #: AIR 1406

Title: *Lightning Protection and Static Electrification*

Key Word(s): Lightning

Effective Date: 1976

Revision Level: Original 1976

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide information on lightning protection and static electrification.

Comments: None

Document #: AIR 1423

Title: *Electromagnetic Compatibility on Gas Turbine Engines for Aircraft Propulsion*

Key Word(s): Gas Turbine Engines

Effective Date: 1977

Revision Level: Original 1977

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide information to achieve EMC with gas turbine engines used for aircraft propulsion.

Comments: None

Document #: AIR 1425

Title: *Methods of Achieving Electromagnetic Compatibility of Gas Turbine Engine Accessories for Self-Propelled Vehicles*

Key Word(s): Gas Turbine Engines

Effective Date: 1978

Revision Level: Original 1978

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide methods for achieving EMC with gas turbine engine accessories used for self propelled vehicles.

Comments: None

Document #: AIR 1500

Title: *Bibliography, Lossy Filters*

Key Word(s): Lossy Filters

Effective Date: 1977

Revision Level: Original 1977

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide a bibliography on lossy filters and their applicability to EMC.

Comments: None

Document #: AIR 1509

Title: *EMC Antennas and Antenna Factors: How to Use Them*

Key Word(s): Antennas

Effective Date: 1978

Revision Level: Original 1978

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to discuss use and application of EMC antennas and antenna factors. Relationships among antenna gain, antenna factor, power density (W/M^2), and field strength (V/M) are discussed.

Comments: None

Document #: AIR 1662

Title: *Minimization of Electrostatic Hazards in Aircraft Fuel Systems*

Key Word(s): HERF

Effective Date: 1984

Revision Level: Original 1984

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide procedures for minimization of electrostatic hazards in aircraft fuel systems.

Comments: None

Document #: AIR 1700

Title: *Transition Frequency: An Upper Frequency Measurement Boundary for Evaluation of Shielding Effectiveness in Cylindrical Systems*

Key Word(s): Shielding

Effective Date: 1986

Revision Level: Original 1986

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide methods for investigating the upper frequency measurement boundary for evaluating shielding effectiveness in cylindrical systems.

Comments: None

Document #: AIR 4079 (in Draft)
Title: *Procedure for Digitized Method of Spark Energy Measurement*
Key Word(s): Spark Energy Measurement
Effective Date: NA
Revision Level: NA
Supersedence: NA
Applicability: This document will be applicable for government and industry use.
Purpose: The purpose of this document is to describe a digitized method for measuring spark energy.
Comments: This document has not been released for publication.

Document #: ARP 935
Title: *Suggested EMI Control Plan Outline*
Key Word(s): EMI Control Plan
Effective Date: 1970
Revision Level: Original 1970
Supersedence: NA
Applicability: This document is available for government and industry use.
Purpose: The purpose of this document is to suggest an EMI control plan outline.
Comments: This document presents a discussion covering the scope of the EMI control program with respect to contractual EMC requirements.

Document #: ARP 936A

Title: *Capacitor, 10 mF for EMI Measurements*

Key Word(s): Capacitors

Effective Date: 1989

Revision Level: Original 1989

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to describe a standard capacitor that can be used for EMI measurements.

Comments: None

Document #: ARP 958A

Title: *Broadband EMI Measurement Antennas, Standard Calibration Requirements and Methods*

Key Word(s): Antennas, Broadband Antennas

Effective Date: 1992

Revision Level: Original 1992

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to outline a standard method and technique for the checkout and calibration of broadband EMI measurement antennas.

Comments: This document covers EMC test antennas that can operate in the 200 MHz to 10 GHz frequency range.

Document #: ARP 1172

Title: *Filters, Conventional, EMI Reduction, Specifications for*

Key Word(s): Filters

Effective Date: 1972

Revision Level: Original 1972

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide general specifications for conventional EMI reduction filters.

Comments: None

Document #: ARP 1173

Title: *Test Procedures to Measure the RF Shielding Characteristics of EMI Gaskets*

Key Word(s): Shielding, EMI Gaskets

Effective Date: 1975

Revision Level: Original 1975

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to establish a testing technique for measuring the RF shielding characteristics of shielding gasket materials, and to establish standard terminology and references.

Comments: None

Document #: ARP 1267

Title: *EMI Measurements of Impulse Generators, Standard Calibration Requirements and Techniques*

Key Word(s): Impulse Generators

Effective Date: 1973

Revision Level: Original 1973

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to establish standard calibration requirements and techniques for impulse generators.

Comments: None

Document #: ARP 1481

Title: *Corrosion Control and Electrical Conductivity in Enclosure Design*

Key Word(s): Corrosion Control

Effective Date: 1978

Revision Level: Original 1978

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide procedures to achieve corrosion control and electrical conductivity in enclosure design.

Comments: None

Document #: ARP 1705

Title: *Coaxial Test Procedure to Measure the RF Shielding Characteristics of EMC Gasket Materials*

Key Word(s): Shielding, Gaskets

Effective Date: 1981

Revision Level: Original 1981

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to establish a technique for reliably measuring RF shielding characteristics of EMI gasket materials and to establish standard terminology.

Comments: None

Document #: ARP 1870

Title: *Aerospace Systems Electrical Bonding and Grounding for Electromagnetic Compatibility and Safety*

Key Word(s): Bonding, Grounding

Effective Date: 1987

Revision Level: Original 1987

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide guidance for aerospace bonding and grounding for EMC and safety.

Comments: None

Document #: ARP 1972

Title: *Recommended Measurement Practices and Procedures for EMC Testing*

Key Word(s): EMC Testing

Effective Date: 1986

Revision Level: Original 1986

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to recommend a standard set of procedures for industry-wide EMC testing that are similar to the military MIL-STD-461 and MIL-STD-462 procedures.

Comments: None

Document #: ARP 4043

Title: *Flightline Bonding and Grounding of Aircraft*

Key Word(s): Bonding, Grounding

Effective Date: 1986

Revision Level: Original 1986

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide standard procedures for flightline bonding and grounding of aircraft.

Comments: None

Document #: ARP 4242 (Draft)
Title: *Electromagnetic Compatibility Control Requirements, Systems*
Key Word(s): EMC Control
Effective Date: When Approved
Revision Level: Draft
Supersedence: NA
Applicability: This document is applicable for government and industry use.
Purpose: The purpose of this document is to provide EMC control requirements for systems.
Comments: None

Document #: ARP 4244 (Draft)
Title: *Recommended Insertion Loss Test Methods for EMI Power Line Filters*
Key Word(s): Insertion Loss, Power Line Filters
Effective Date: When Approved
Revision Level: Draft
Supersedence: NA
Applicability: This document is applicable for government and industry use.
Purpose: The purpose of this document is to provide recommended insertion loss test methods for EMI power line filters.
Comments: None

Document #: J 551-90

Title: *Performance Levels and Methods of Measurement of Electromagnetic Radiation From Vehicles and Devices (30 to 1000 MHz) Standard*

Key Word(s): EMR Measurement

Effective Date: March 1990

Revision Level: Update Mar 1990
Original 1985

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide test procedures and recommend levels for measurement of electromagnetic radiation from motor vehicles and other devices powered by internal combustion engines (excluding aircraft).

Comments: None

Document #: J 1113-87

Title: *Electromagnetic Susceptibility Measurement Procedures for Vehicle Components (Except Aircraft), Recommended Practice*

Key Word(s): Susceptibility

Effective Date: August 1987

Revision Level: Update Aug 1987
Original 1984

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to establish uniform laboratory techniques for the measurement and determination of the susceptibility to undesired EM sources of electrical and electromechanical ground-vehicle components.

Comments: None

Document #: J 1338-81

Title: *Open-Field Whole Vehicle Radiated Susceptibility, 10 kHz-18 GHz, Electric Field. Information Report*

Key Word(s): Susceptibility

Effective Date: June 1981

Revision Level: Original Jun 1981

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide procedures for open-field, whole vehicle, radiated susceptibility measurements, 10 kHz-18 GHz electric field.

Comments: None

Document #: J 1448-84

Title: *Electromagnetic Susceptibility Measurements of Vehicle Components Using TEM Cells (14 kHz-200 MHZ). Information Report*

Key Word(s): Susceptibility

Effective Date: January 1984

Revision Level: Original Jan 1984

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide procedures for electromagnetic susceptibility measurements of vehicle components using TEM Cells.

Comments: None

Document #: J 1547-88

Title: *Electromagnetic Susceptibility Procedures for Common Mode Injection (1-400 MHz), Module Testing. Information Report*

Key Word(s): Electromagnetic Susceptibility Procedures

Effective Date: October 1988

Revision Level: Original Oct 1988

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide electromagnetic susceptibility procedures for common mode injection module testing.

Comments: None

Document #: J 1812-88

Title: *Function Performance Status Classification for EMC Susceptibility Testing of Automotive Electronic and Electrical Devices. (Information Report)*

Key Word(s): Susceptibility

Effective Date: October 1988

Revision Level: Original Oct 1988

Supersedence: NA

Applicability: This document is applicable for government and industry use.

Purpose: The purpose of this document is to provide function performance status classification for EMC susceptibility testing of automotive electronic and electrical devices.

Comments: None

SECTION 8

FOREIGN NATIONAL AND NATO EMC-RELATED DOCUMENTS

8.1 INTRODUCTION

A major effort is under way at this time to harmonize all types of standards worldwide. The standardization documents of the North Atlantic Treaty Organization (NATO), the European Union (EU), Canada, Germany, and the United Kingdom (UK) are being influenced by this effort. The compilation of documents presented in this section represent only a small percentage of the documents throughout the world related to EMC.

With the implementation of new international and European standards, new products will be required to meet the new standards. Also with the DoD emphasis on procurement of commercial-off-the-self (COTS) items, it will be necessary to understand and compare these revised world standards with the military standards used in the past by the DoD. NATO EMC-related STANAGs, EU standards on EMC, Canadian EMC-related standards, German EMC specifications, and United Kingdom EMC-related standards are listed in Tables 8-1 through 8-5, respectively.

8.1.1 NATO EMC-Related Standardization Agreements (STANAGs)

Standards agreements ratified by NATO have been developed over many years to improve supply systems, safety, procurement practices, military deployment, distribution and EMC of electronic systems. STANAGs are developed by agreement of the NATO member nations. In many cases, the agreements were adapted from existing standards used by member nations. In other cases, the agreements were adapted, or taken directly, from international standards. Certain other standards were developed within the NATO organization. Ratification of a STANAG is usually a lengthy process due to the requirement for translation from the member nation's language and the many political issues involved. Summaries of EMC-related STANAGs are presented in Section 8.2.

8.1.2 European Union EMC-Related Standardization Documents

The European Union (EU), previously known as the European Economic Community (EEC), has issued a general EMC directive requiring that electrical equipment must not cause undue interference to radio and telecommunications equipment and that equipments must also possess enough immunity to interference to operate as intended. The directive sets up a framework for the adoption of EMC standards. Many of the standards being developed were adapted from international standards used by many nations. The EU plan for standardization has included procedures for industry throughout the world to participate in the program.

EU standards are adopted upon the recommendation of an expert technical committee run by the Committee of European Electrotechnical Standardization (CENELEC). The EEC/EU standards presented here have been adopted by recommendation of the CENELEC. The document numbers are preceded by the letters EN to indicate the European Norm. Summaries of EEC/EU EMC-related standards are presented in Section 8.3.

8.1.3 Canadian EMC-Related Standardization Documents

Canadian standards are issued by the Canadian Standards Association (CSA), which is accredited by the Standards Council of Canada and the National Standards System. It is a not-for-profit, non-statutory, voluntary membership development and certification activity. CSA standards are often adapted from international standards, and reflect a national consensus of manufacturers, consumers, retailers, unions and professional organizations, and government agencies. The standards are used widely by industry and commerce, and often are adopted into regulations by municipal, provincial, and federal government. Summaries of Canadian EMC-related standards are presented in Section 8.4.

8.1.4 German EMC-Related Standardization Documents

Germany has compiled some of the most detailed and comprehensive bodies of EMC regulations in Europe. When the transition period established by the EMC Directive 92/31/EEC

ends 31 December 1995, those German EMC regulations that are not already fully harmonized will be replaced by the EU standards published in the Official Journal of the European Communities.

The Verband Deutscher Electrotechniker (VDE) organizations publish the German standards listed in this subsection. Regulations for personal safety, consumer protection, reliability, and harmonization of German and international standards are prepared by VDE standards committees. Copies of regulations may be ordered from the VDE publishing house. The VDE Testing Station tests for EMC compliance. Summaries of the German VDE specifications most commonly used for EMC compliance testing are presented in Section 8.5.

8.1.5 United Kingdom EMC-Related Standardization Documents

The United Kingdom standards are issued by the British Standards Institution (BSI). The United Kingdom has strict rules on radio interference. The large number of standards included in this subsection verify their comprehensive coverage of EMC. However, the European EMC Directive applies to more categories of equipment, and the British Standards Institute is already adopting CENELEC-approved generic standards. The British Department of Trade and Industry (DTI) has issued a consultative report on the European Community Directive, and has adopted some proposals from trade associations and individual companies. Products currently in service will not have to be modified. However all equipment designed, manufactured, or imported after the final date of implementation of the directive will have to comply with the requirements. Summaries of United Kingdom EMC-related standards are presented in Section 8.6.

Table 8-1. NATO EMC-Related Standardization Agreements (STANAGs)

NATO STANAG-1233	<i>Procedures for RADHAZ Control in Ports and the Territorial Sea</i>
NATO STANAG-1305	<i>RADHAZ Procedures for Receiving Aircraft of other Nations on NATO Air Capable Ships</i>
NATO STANAG-1307	<i>Maximum NATO Naval Operational Electromagnetic Environment Produced by Radio and Radar</i>
NATO STANAG-1308	<i>RADHAZ to Ships Personnel During Helicopter (and VSTOL Aircraft) Operations on Ships Other Than Aircraft Carriers</i>
NATO STANAG-2345	<i>Control and Recording of Personnel Exposure to Radio-Frequency Radiation</i>
NATO STANAG-3456	<i>Aircraft Electrical System Characteristics</i>
NATO STANAG-3516	<i>Electromagnetic Interference and Test Methods for Aircraft Electrical and Electronic Equipment</i>
NATO STANAG-3614	<i>Electromagnetic Compatibility (EMC) of Aircraft Systems</i>
NATO STANAG-3659	<i>Bonding and In-flight Lightning Protection for Aircraft</i>
NATO STANAG-3682	<i>Electrostatic Safety Connection Procedures for Liquid Fuel Loading/Unloading Operations During Ground Transfer</i>
NATO STANAG-3731	<i>Bibliography on Electromagnetic Compatibility (EMC)</i>
NATO STANAG-3828	<i>Minimum Requirements for Aircrew Protection Against the Hazards of Laser Target Designators</i>
NATO STANAG-3873	<i>Electronic Warfare (EW) In Air Operations ATP-44A</i>
NATO STANAG-3900	<i>EMC of Airborne Electro-Explosive Sub-Systems</i>
NATO STANAG-3968	<i>NATO Glossary of Electromagnetic Terminology</i>
NATO STANAG-3991	<i>Design Criteria to Minimize Generation of Static Electricity Within Aircraft Fuel Systems</i>
NATO STANAG-4006	<i>Shielded Sparking Plugs (for 5 mm Lead) for Wheeled Tactical Vehicles (Pt 1) and Shielded Ignition Cables for Wheeled Tactical Vehicles (Pt 2)</i>
NATO STANAG-6004	<i>Meaconing, Intrusion, Jamming and Interference Report</i>
NATO STANAG-6010	<i>Electronic Warfare In The Land Battle ATP-51</i>

Table 8-2. European Union EMC-Related Standardization Documents

D 89/336/EEC	<i>European Economic Community (EEC) Council EMC Directive</i>
D 92/31/EEC	<i>Amendment to Directive 89/336/EEC on the Approximation of the Laws of the Member States Relating to Electromagnetic Compatibility</i>
EN 50065-1	<i>Signalling On Low-Voltage Electrical Installations in the Frequency Range 3 to 148.5 kHz - Part 1: General Requirements, Frequency Bands and Electromagnetic Disturbances</i>
EN 50081-1	<i>Electromagnetic Compatibility Generic Emission Standard - Part 1: Residential Commercial and Light Industry</i>
EN 50082-1	<i>Electromagnetic Compatibility Generic Immunity Standard - Part 1: Residential Commercial and Light Industry</i>
EN 55011	<i>Limits and Methods of Measurement of Radio Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment</i>
EN 55013	<i>Limits and Methods of Measurement of Radio Disturbance Characteristics of Broadcast Receivers and Associated Equipment</i>
EN 55014	<i>Limits and Methods of Measurement of Radio Interference Characteristics of Household Electrical Appliances, Portable Tools and Similar Electrical Apparatus</i>
EN 55015	<i>Limits and Methods of Measurement of Radio Interference Characteristics of Florescent Lamps and Luminaries</i>
EN 55020	<i>Immunity from Radio Interference of Broadcast Receivers and Associated Equipment</i>
EN 55022	<i>Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment</i>
EN 60555-2	<i>Disturbances in Supply Systems Caused by Household Appliances and Similar Electrical Equipment Part 2: Harmonics</i>
EN 60555-3	<i>Disturbances in Supply Systems Caused by Household Appliances and Similar Electrical Equipment Part 3: Voltage Fluctuations</i>

Table 8-3. Canadian EMC-Related Standardization Documents

C108.1.1-1977	<i>Electromagnetic Interference Measuring Instrument, CISPR Type</i>
C108.1.2-M1981	<i>Electromagnetic Interference Measuring Instrument, ANSI Type</i>
CAN3-C108.1.5-M85	<i>Line Impedance Stabilization Network (LISN)</i>
CAN3-C108.3.1-M84	<i>Limits and Measurement Methods of Electromagnetic Noise from AC Power Systems, 0.15-30 MHz</i>
CAN/CSA-C108.4-M92	<i>Limits and Methods of Measurement of Radio Interference Characteristics of Vehicles, Motor Boats, and Spark-Ignited Engine-Driven Devices (50-1000 MHz)</i>
CAN/CSA-C108.6-M91	<i>Limits and Methods of Measurement of Electromagnetic Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment</i>
C108.8-M 1983	<i>Electromagnetic Emissions from Data Processing Equipment and Electronic Office Machines</i>
CAN/CSA-C108.9-M91	<i>Sound and Television Broadcasting Receivers and Associated Equipment Limits and Methods of Measurement of Immunity Characteristics</i>
RIR-2	<i>Radio Interference Regulations of Canada</i>

Table 8-4. German EMC-Related Standardization Documents

VDE 871	<i>Limits of Radio Interference from RF Apparatus and Installations Part 1: Radio Interference Suppression and RF Equipment for Industrial, Scientific and Medical (ISM) and Similar Purposes</i>
	<i>Part 2: Data Processing Equipment and Electronic Office Machines</i>
VDE 875	<i>Specification for the Radio Interference Suppression of Appliances, Machines and Installations of Rated Frequencies</i>
	<i>Part 1: Household Appliances</i>
	<i>Part 2: Fluorescent Devices</i>
	<i>Part 3: Electrical Devices other than Household Appliances and Fluorescent Devices</i>
VDE 876	<i>Radio Interference Measuring Apparatus</i>
	<i>Part 1: Radio-Interference Receiver with Weighted Indication and Accessories</i>
	<i>Part 2: Disturbance Analyzer for the Automatic Assessment of Interference Produced by Switching Operations</i>
	<i>Part 3: Current Probes for Measuring Radio Interference</i>
VDE 877	<i>Measurement of Radio Interference</i>
	<i>Part 1: Measurement of Radio Interference Voltages</i>
	<i>Part 2: Measurement of Radio Interference Field Strengths</i>
	<i>Part 3: Measurement of Radio Interference Power on Leads</i>
VDE 878	<i>RF Suppression of Telecommunications Systems, Parts 1 and 2</i>

Table 8-5. United Kingdom EMC-Related Standardization Documents

BS 613 1977	<i>Specification for Components and Filter Units for Electromagnetic Interference Suppression</i>
BS 727 1983	<i>Specification for Radio Interference Measurement Apparatus</i>
BS 800 1988	<i>Specification for Radio Interference Limits and Measurements for Household Appliances, Portable Tools and Other Electrical Equipment Causing Similar Types of Interference</i>
BS 833 1985	<i>Radio Interference Limits and Measurements for the Electrical Ignition Systems of Internal Combustion Engines</i>
BS 905 1985	<i>Sound and Television Broadcast Receivers and Associated Equipment Electromagnetic Compatibility Part 1: Specification for Limits of Radio Interference (CISPR 13) Part 2: Specification for Limits of Immunity (CISPR 20)</i>
BS 1597 1985	<i>Specification for Limits and Methods of Measurement of Electromagnetic Interference Generated by Marine Equipment and Installations</i>
BS 4727 1976	<i>Glossary of Electrotechnical, Power Telecommunications, Electronics, Lightning and Colour Terms Part 1: Group 09 Radio Interference Technology</i>
BS 4809 1981	<i>Radio Interference Limits and Measurements for Radio Frequency Heating Equipment</i>
BS 5049 1981	<i>Methods of Measurement of Radio Noise From Power Supply Apparatus for Operation at 1 kV and Above</i>
BS 5260 1981	<i>Code of Practice for Radio Interference Suppression on Marine Installations</i>
BS 5394 1988	<i>Specification For Limits and Methods of Measurement of Radio Interference Characteristics of Florescent Lamps and Luminaries</i>
BS 5406 1988	<i>The Limitations of Disturbances in Electricity Supply Networks Caused by Domestic and Similar Appliances Equipped With Electronic Devices</i>
BS 5602 1978	<i>Code of Practice for Abatement of Radio Interference from Overhead Power Lines</i>
BS 5783 1984	<i>Code of Practice for Handling of Electrostatic Devices</i>
BS 6021 1982	<i>Fixed Capacitors for Use In Electronic Equipment Part 3: Specification for Fixed Capacitors for Radio Interference Suppression Selection of Methods of Test and General Requirements</i>
BS 6299 1982	<i>Method of Measurement of the Suppression Characteristics of Passive Radio Interference Filters and Suppression Components</i>
BS 6345 1983	<i>Methods for Measurement of Radio Interference Terminal Voltage of Lightning Equipment</i>
BS 6527 1988	<i>Specification for Limits and Measurements of Radio Interference Characteristics of Information Technology Equipment</i>
BS 6651 1985	<i>The Protection of Structures Against Lightning</i>
BS 6656 1986	<i>Prevention of Inadvertent Ignition of Flammable Atmospheres by Radio Frequency Radiation</i>
BS 6657 1986	<i>Prevention of Inadvertent Initiation of Electro-Explosive Devices by Radio Frequency Radiation</i>
BS 6667 1985	<i>EMC Requirements for Industrial Process Control Instrumentation</i>
BS 6839 1987	<i>Mains Signalling Equipment Part 1: Specification for Communication and Interference Limits and Measurements Part 2: Specifications for Interfaces</i>
DD 158 1987	<i>Filters for Mains Signalling Systems</i>
3G 100 1980	<i>Specifications for General Requirements for Equipment for Use in Aircraft Part 4: Section 2, Electromagnetic Interference at Radio and Audio Frequencies</i>

8.2 NATO EMC-RELATED STANAGs

Summaries of EMC-related NATO STANAGs are presented in this subsection.

Document #: NATO STANAG-1233

Title: *Procedures for RADHAZ Control in Ports and the Territorial Sea*

Key Word(s): Radiation Hazards

Effective Date: 23 February 1984

Revision Level: Amendment 3 01 Mar 1993
First Edition 23 Feb 1984

Supersedence: NA

Applicability: This STANAG is applicable to NATO Forces in ports and in the territorial sea.

Purpose: The purpose of this STANAG is to provide procedures for control of radio and radar radiation hazards in ports and in the territorial seas.

Comments: France is the custodian of this STANAG.

Document #: NATO STANAG-1305

Title: *RADHAZ Procedures for Receiving Aircraft of other Nations on NATO Air Capable Ships*

Key Word(s): Radiation Hazards

Effective Date: 19 December 1989

Revision Level: Amendment 3 05 Feb 1993
First Edition 19 Dec 1989

Supersedence: NA

Applicability: This STANAG is applicable for operations on NATO air capable ships.

Purpose: The purpose of this STANAG is to provide procedures for RADHAZ safety on NATO air capable ships.

Comments: France is the custodian of this STANAG.

Document #: NATO STANAG-1307

Title: *Maximum NATO Naval Operational Electromagnetic Environment Produced by Radio and Radar*

Key Word(s): Radar Radiation Limits

Effective Date: 15 October 1986

Revision Level: Amendment 3 08 Feb 1993
First Edition 15 Oct 1986

Supersedence: NA

Applicability: This STANAG is applicable to NATO Naval Forces operating in radio and radar electromagnetic environments.

Purpose: The purpose of this STANAG is to provide procedures for considering the maximum NATO Naval operational electromagnetic environment produced by radio and radar with respect to radiation hazards.

Comments: Italy is the custodian of this STANAG.

Document #: NATO STANAG-1308

Title: *RADHAZ to Ships Personnel During Helicopter (and VSTOL Aircraft) Operations on Ships Other Than Aircraft Carriers*

Key Word(s): Radiation Hazards

Effective Date: 4 October 1989

Revision Level: Amendment 1 19 Jan 1993
First Edition 04 Oct 1989

Supersedence: NA

Applicability: This STANAG is applicable to NATO Forces operations during helicopter (and VSTOL aircraft) operations on ships other than aircraft carriers.

Purpose: The purpose of this STANAG is to provide procedures for protection of NATO Forces from radio and radar radiation hazards on ships other than aircraft carriers.

Comments: France is the custodian of this STANAG.

Document #: NATO STANAG-2345

Title: *Control and Recording of Personnel Exposure to Radio-Frequency Radiation*

Key Word(s): Exposure to RF Radiation, Radiation Exposure

Effective Date: 25 June 1986

Revision Level: Amendment 6
First Edition 25 Jun 1986

Supersedence: NA

Applicability: This document is applicable for use by NATO Forces subject to exposure from RF radiation.

Purpose: The purpose of this document is to provide guidance for control and evaluation of exposure of personnel to RF radiation.

Comments: Belgium is the custodian of this STANAG.

Document #: NATO STANAG-3456

Title: *Aircraft Electrical System Characteristics*

Key Word(s): Aircraft Electrical System Characteristics

Effective Date: 21 October 1976

Revision Level: Amendment 5 03 Mar 1993
Fourth Edition 21 Oct 1976

Supersedence: NA

Applicability: This STANAG is applicable to NATO air activities.

Purpose: The purpose of this STANAG is to provide information on electrical and electromagnetic hazards on NATO aircraft.

Comments: Germany is the custodian of this STANAG. This document is coordinated with MIL-STD-704.

Document #: NATO STANAG-3516

Title: *Electromagnetic Interference and Test Methods for Aircraft Electrical and Electronic Equipment*

Key Word(s): Aircraft Electrical and Electronic Equipment

Effective Date: 5 October 1993

Revision Level: Fourth Edition 05 Oct 1993

Supersedence: NA

Applicability: This STANAG is applicable to NATO air activities.

Purpose: The purpose of this STANAG is to provide the minimum requirement and essential test methods pertaining to intra-system electromagnetic compatibility of electrical and electronic equipment, including ground support equipment for use with aircraft systems.

Comments: Canada is the custodian of this STANAG. This STANAG is coordinated with MIL-STD-461 and MIL-STD-462.

Document #: NATO STANAG-3614

Title: *Electromagnetic Compatibility (EMC) of Aircraft Systems*

Key Word(s): Aircraft EMC

Effective Date: 8 June 1989

Revision Level: Third Edition 08 Jun 1989

Supersedence: NA

Applicability: This STANAG is applicable to NATO air activities.

Purpose: The purpose of this STANAG is to provide minimum requirements for permissible electromagnetic emissions, susceptibility, and transient levels to assure compatibility of electrical and electronic systems on-board aircraft. Measuring procedures to ascertain compliance are also defined.

Comments: The US is the custodian of this STANAG. This STANAG is coordinated with MIL-E-6051.

Document #: NATO STANAG-3659

Title: *Bonding and In-flight Lightning Protection for Aircraft*

Key Word(s): Lightning Protection for Aircraft

Effective Date: 24 February 1975

Revision Level: Amendment 7 29 Jul 1992
First Edition 24 Feb 1975

Supersedence: NA

Applicability: This STANAG is applicable to NATO air activities.

Purpose: The purpose of this STANAG is to establish minimum bonding and in-flight lightning protection requirements for aircraft.

Comments: The US is the custodian of this STANAG.

Document #: NATO STANAG-3682

Title: *Electrostatic Safety Connection Procedures for Liquid Fuel Loading/Unloading Operations During Ground Transfer*

Key Word(s): HERF

Effective Date: 6 July 1990

Revision Level: Fourth Edition 06 Jul 1990

Supersedence: NA

Applicability: This STANAG is applicable to NATO Forces loading/unloading operations during ground transfer of liquid fuel.

Purpose: The purpose of this STANAG is to provide safety procedures for liquid fuel loading/unloading during ground transfer.

Comments: Germany is the custodian of this STANAG.

Document #: NATO STANAG-3731

Title: *Bibliography on Electromagnetic Compatibility (EMC)*

Key Word(s): EMC Bibliography

Effective Date: 6 July 1990

Revision Level: Amendment 2 09 Mar 1983
 Second Edition 06 July 1990

Supersedence: NA

Applicability: This STANAG is applicable for NATO Forces concerned with EMC.

Purpose: The purpose of this STANAG is to provide a bibliography of EMC terms for use by NATO Forces.

Comments: Germany is the custodian of this STANAG.

Document #: NATO STANAG-3828

Title: *Minimum Requirements for Aircrew Protection Against the Hazards of Laser Target Designators*

Key Word(s): Laser Target Designators Hazards

Effective Date: 2 July 1981

Revision Level: Amendment 8 02 Oct 1991
 First Edition 02 Jul 1981

Supersedence: NA

Applicability: This STANAG is applicable for NATO aircrews subject to possible hazards from laser target designators.

Purpose: The purpose of this STANAG is to provide minimum requirements for aircrew protection against the hazards of laser target designators.

Comments: The US is the custodian of this STANAG.

Document #: NATO STANAG-3873

Title: *Electronic Warfare (EW) In Air Operations ATP-44A*

Key Word(s): EW

Effective Date: 20 December 1990

Revision Level: Third Edition 20 Dec 1990

Supersedence: NA

Applicability: The STANAG is applicable to NATO Forces responsible for electronic warfare in air operations.

Purpose: The purpose of this STANAG is to provide procedures for NATO Forces involved in EW air operations.

Comments: The NATO Electronic Warfare Committee (EWC) is the custodian of this STANAG.

Document #: NATO STANAG-3900

Title: *EMC of Airborne Electro-Explosive Sub-Systems*

Key Word(s): Airborne Electro-Explosive Subsystems

Effective Date: 28 November 1984

Revision Level: Amendment 1 17 Dec 1986
First Edition 28 Nov 1984

Supersedence: NA

Applicability: This STANAG is applicable to NATO Forces responsible for handling of airborne electro-explosive subsystems.

Purpose: The purpose of this STANAG is to provide procedures for preventing electrical and electromagnetic hazards on board aircraft that may result from electro-explosive subsystems.

Comments: The UK is the custodian of this STANAG.

Document #: NATO STANAG-3968

Title: *NATO Glossary of Electromagnetic Terminology*

Key Word(s): NATO Glossary of Electromagnetic Terminology

Effective Date: 20 December 1985

Revision Level: Amendment 1 16 Dec 1992
Second Edition 20 Dec 1985

Supersedence: NA

Applicability: This STANAG is applicable for all NATO Forces using electromagnetic terminology.

Purpose: The purpose of this STANAG is to provide a standard glossary of electromagnetic terminology for all NATO forces.

Comments: The US is the custodian of this STANAG.

Document #: NATO STANAG-3991

Title: *Design Criteria to Minimize Generation of Static Electricity Within Aircraft Fuel Systems*

Key Word(s): HERF

Effective Date: 3 July 1990

Revision Level: Amendment 1 25 Jul 1991
Second Edition 03 Jul 1990

Supersedence: NA

Applicability: This STANAG is applicable to the design of NATO aircraft fuel systems.

Purpose: The purpose of this STANAG is to provide design criteria to minimize generation of static electricity within aircraft fuel systems.

Comments: The US is the custodian of this STANAG.

Document #: NATO STANAG-4006

Title: *Shielded Sparking Plugs (for 5 mm Lead) for Wheeled Tactical Vehicles (Pt 1) and Shielded Ignition Cables for Wheeled Tactical Vehicles (Pt 2)*

Key Word(s): Ignition Systems

Effective Date: 8 March 1965

Revision Level: Amendment 1 15 Aug 1967
First Edition 08 Mar 1965

Supersedence: NA

Applicability: This STANAG is applicable to NATO Forces utilizing wheeled vehicles.

Purpose: The purpose of this STANAG is to standardize certain dimensions of shielded plugs (for 5-mm leads) for wheeled vehicles used by NATO Armed Forces.

Comments: NATO (policy and coordination staff) is the custodian of this STANAG.

Document #: NATO STANAG-6004

Title: *Meaconing, Intrusion, Jamming and Interference Report*

Key Word(s): Meaconing, Intrusion, Jamming and Interference, MIJI

Effective Date: 13 March 1992

Revision Level: Third Edition 13 Mar 1992

Supersedence: NA

Applicability: This STANAG is applicable to NATO Forces experiencing incidents of meaconing, intrusion, jamming and interference (MIJI).

Purpose: The purpose of this STANAG is to provide a standard format for reporting of MIJI incidents.

Comments: NATO (operations division) is the custodian of this STANAG.

Document #: NATO STANAG-6010

Title: *Electronic Warfare In The Land Battle ATP-51*

Key Word(s): EW

Effective Date: 22 November 1989

Revision Level: Amendment 1 12 Feb 1992
First Edition 22 Nov 1989

Supersedence: NA

Applicability: This STANAG is applicable to NATO Forces responsible for electronic warfare in the land battle.

Purpose: The purpose of this STANAG is to provide procedures for NATO use of electronic warfare in the land battle.

Comments: The NATO Electronic Warfare Committee (EWC) is the custodian of this STANAG.

8.3 EUROPEAN UNION EMC STANDARDS

Summaries of EEC/EU EMC standards are presented in this subsection.

Document #: D 89/336/EEC

Title: *European Economic Community (EEC) Council EMC Directive*

Key Word(s): EEC EMC Directives, EU EMC Directives

Effective Date: 3 May 1989

Revision Level: Amendment 1 28 Apr 1992
First Edition 03 May 1989

Supersedence: NA

Applicability: This directive is applicable to the member states of the EU.

Purpose: The purpose of the EMC directive is to ensure interfunctioning of the electrical equipment and, therefore, their free circulation within the European Communities. Thus, units must not cause undue interference to radio and telecommunications equipment and the equipment must possess sufficient immunity to operate as intended.

Comments: None

Document #: D 92/31/EEC

Title: *Amendment to Directive 89/336/EEC on the Approximation of the Laws of the Member States Relating to Electromagnetic Compatibility*

Key Word(s): EMC Laws

Effective Date: 28 April 1992

Revision Level: First Edition 28 Apr 1992

Supersedence: NA

Applicability: This directive is applicable to the member states of the EU.

Purpose: The purpose of this directive is to modify the dates for application of the requirements of D 89/336/EEC and provide for a more harmonious transition to the original EMC directive.

Comments: None

Document #: EN 50065-1

Title: *Signalling On Low-Voltage Electrical Installations in the Frequency Range 3 to 148.5 kHz - Part 1: General Requirements, Frequency Bands and Electromagnetic Disturbances*

Key Word(s): Low-Voltage Electrical Signalling

Effective Date: 1990

Revision Level: First Edition 1990

Supersedence: NA

Applicability: This standard is applicable to the member states of the EU.

Purpose: The purpose of this standard is to provide general requirements for signalling on low-voltage electrical installations in the frequency range from 3.0 to 148.5 kHz.

Comments: None

Document #: EN 50081-1

Title: *Electromagnetic Compatibility Generic Emission Standard - Part 1:- Residential Commercial and Light Industry*

Key Word(s): Generic Emission Standard

Effective Date: 1991

Revision Level: First Edition 1991

Supersedence: NA

Applicability: This standard is applicable to the member states of the EU.

Purpose: The purpose of this generic standard is to provide methods for demonstrating that emissions from residential commercial and light industry equipment not covered by specific EU standards are in compliance with the EMC directive.

Comments: None

Document #: EN 50082-1

Title: *Electromagnetic Compatibility Generic Immunity Standard - Part 1: Residential Commercial and Light Industry*

Key Word(s): Generic Immunity Standard

Effective Date: 1991

Revision Level: First Edition 1991

Supersedence: NA

Applicability: This standard is applicable to the member states of the EU.

Purpose: The purpose of this generic standard is to provide test methods for demonstrating that immunity of residential and light industry equipment not covered by specific EU standards are in compliance with the EMC directive.

Comments: None

Document #: EN 55011

Title: *Limits and Methods of Measurement of Radio Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment*

Key Word(s): ISM

Effective Date: 1990

Revision Level: EU Ratification 1990
Second Edition 1990

Supersedence: NA

Applicability: This standard is applicable to the member states of the EU.

Purpose: The purpose of this standard is to provide limits and methods of measuring EMC characteristics of ISM equipment.

Comments: This standard is based on CISPR11 (1990), Second Edition. The standard was ratified by the EU in 1990.

Document #: EN 55013

Title: *Limits and Methods of Measurement of Radio Disturbance Characteristics of Broadcast Receivers and Associated Equipment*

Key Word(s): Broadcast Receivers

Effective Date: 1988

Revision Level: EU Ratification 1988
Amendment 1 1983
First Edition 1975

Supersedence: NA

Applicability: This standard is applicable to the member states of the EU.

Purpose: The purpose of this standard is to provide limits and methods of measuring the radio disturbance characteristics of broadcast receivers and associated equipment.

Comments: This standard is based on CISPR13 (1975), First Edition, and Amendment 1, 1983. The standard was ratified by the EU in 1988.

Document #: EN 55014

Title: *Limits and Methods of Measurement of Radio Interference Characteristics of Household Electrical Appliances, Portable Tools and Similar Electrical Apparatus*

Key Word(s): Household Appliances

Effective Date: 1986

Revision Level: EU Ratification 1986
Second Edition 1985

Supersedence: NA

Applicability: This standard is applicable to the member states of the EU.

Purpose: The purpose of this standard is to provide limits and methods of measuring radio interference characteristics of household electrical appliances, portable tools and similar electrical apparatus.

Comments: This standard is based on CISPR14, Second Edition, and British Standard BS800 (1988). The standard was ratified by the EU in 1986.

Document #: EN 55015

Title: *Limits and Methods of Measurement of Radio Interference Characteristics of Florescent Lamps and Luminaries*

Key Word(s): Florescent Lamps

Effective Date: 1986

Revision Level: EU Ratification 1986
Third Edition 1985

Supersedence: NA

Applicability: This standard is applicable to the member states of the EU.

Purpose: The purpose of this standard is to provide limits and methods of measuring radio interference characteristics of florescent lamps and luminaries.

Comments: The standard is based on CISPR15 (1985), Third Edition. The standard was ratified by the EU in 1986.

Document #: EN 55020

Title: *Immunity from Radio Interference of Broadcast Receivers and Associated Equipment*

Key Word(s): Broadcast Receivers

Effective Date: 1987

Revision Level: EU Ratification 1987
First Edition 1985

Supersedence: NA

Applicability: This standard is applicable to the member states of the EU.

Purpose: The purpose of this standard is to provide methods of measuring the immunity of sound and television broadcast receivers and associated equipment in the frequency range from 1.5 to 30 MHz by the CISPR20 current-injection method.

Comments: This standard is based on CISPR20 (1985), and British Standard BS 905 Part 2 (1985).

Document #: EN 55022

Title: *Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment*

Key Word(s): Information Technology Equipment

Effective Date: 1986

Revision Level: EU Ratification 1986
First Edition 1985

Supersedence: NA

Applicability: This standard is applicable to the members of the states of the EU.

Purpose: The purpose of this standard is to provide limits and methods of measuring radio interference characteristics of information technology equipment.

Comments: This standard is based on CISPR22 (1985), First Edition, and British Standard BS6527. The standard was ratified by the EU in 1986.

Document #: EN 60555-2

Title: *Disturbances in Supply Systems Caused by Household Appliances and Similar Electrical Equipment Part 2: Harmonics*

Key Word(s): Household Appliances

Effective Date: 1986

Revision Level: EU Ratification 1986
Amendment 1 1985
First Edition 1982

Supersedence: NA

Applicability: This standard is applicable to the member states of the EU.

Purpose: The purpose of this standard is to address the limitations of disturbances in electricity supply networks caused by domestic and similar appliances equipped with electronic devices. This part of the standard addresses harmonics.

Comments: The standard is based on IEC 555-2 (1982), First Edition, and Amendment 1 (1985) and British Standard BS 5406. The standard was ratified by the EU in 1986.

Document #: EN 60555-3

Title: *Disturbances in Supply Systems Caused by Household Appliances and Similar Electrical Equipment
Part 3: Voltage Fluctuations*

Key Word(s): Household Appliances

Effective Date: 1986

Revision Level: EU Ratification 1986
First Edition 1982

Supersedence: NA

Applicability: This standard is applicable to the member states of the EU.

Purpose: The purpose of this standard is to address the limitations of disturbances in electricity supply networks caused by domestic and similar appliances equipped with electronic devices. This part of the standard addresses voltage fluctuations.

Comments: This standard is based on IEC 555-3 (1982), First Edition. The standard was ratified by the EU in 1986.

8.4 CANADIAN EMC-RELATED STANDARDS

Summaries of EMC-related Canadian standards are presented in this subsection.

Document #:	C108.1.1-1977
Title:	<i>Electromagnetic Interference Measuring Instrument, CISPR Type</i>
Key Word(s):	Electromagnetic Interference Measuring Instrument
Effective Date:	1977
Revision Level:	Amendment 1 02 Sep 1980 First Edition 1977
Supersedence:	NA
Applicability:	This document is applicable for use by measurement facility personnel as set forth in related Canadian Standards Association (CSA) standards on tolerable limits of EMI.
Purpose:	The purpose of this document is to provide the requirements and accessories for measuring levels of conducted and radiated electromagnetic interference utilizing CISPR methods.
Comments:	None

Document #:	C108.1.2-M1981
Title:	<i>Electromagnetic Interference Measuring Instrument, ANSI Type</i>
Key Word(s):	Electromagnetic Interference Measuring Instrument
Effective Date:	1981
Revision Level:	First Edition 1981
Supersedence:	NA
Applicability:	This document is applicable for use by measurement facility personnel as set forth in related Canadian Standards Association (CSA) standards on tolerable limits of EMI.
Purpose:	The purpose of this document is to provide the requirements and accessories for measuring levels of conducted and radiated electromagnetic interference utilizing ANSI methods.
Comments:	None

Document #: CAN3-C108.1.5-M85

Title: *Line Impedance Stabilization Network (LISN)*

Key Word(s): Line Impedance Stabilization Network, LISN

Effective Date: 1985

Revision Level: First Edition 1985

Supersedence: NA

Applicability: This document is applicable for use by measurement facility personnel as set forth in related Canadian Standards Association (CSA) standards on tolerable limits of EMI.

Purpose: The purpose of this document is to provide information on a line termination used to standardize measurement results.

Comments: None

Document #: CAN3-C108.3.1-M84

Title: *Limits and Measurement Methods of Electromagnetic Noise from AC Power Systems, 0.15-30 MHz*

Key Word(s): AC Power Systems

Effective Date: 1984

Revision Level: First Edition 1984

Supersedence: NA

Applicability: This document is applicable to Canadian measurement facility personnel responsible for measurement of electromagnetic radiation originating in AC power lines and any associated generating and distribution systems.

Purpose: The purpose of this document is to provide limits and methods of measuring electromagnetic noise from AC power systems for voltages up to 765 kV phase-to-phase.

Comments: None

Document #: CAN/CSA-C108.4-M92

Title: *Limits and Methods of Measurement of Radio Interference Characteristics of Vehicles, Motor Boats, and Spark-Ignited Engine-Driven Devices (50-1000 MHz)*

Key Word(s): Ignition Systems

Effective Date: 1992

Revision Level: First Edition 1992

Supersedence: NA

Applicability: This document is applicable to Canadian EMC measurement facility personnel responsible for measurement of the radio interference characteristics of vehicles, motor boats, and spark-ignited engine-driven devices.

Purpose: The purpose of this document is to provide limits and methods of measuring radio interference characteristics of vehicles, motor boats, and spark-ignited engine-driven devices that operate from 50 to 1000 MHz.

Comments: None

Document #: CAN/CSA-C108.6-M91

Title: *Limits and Methods of Measurement of Electromagnetic Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment*

Key Word(s): ISM

Effective Date: 1991

Revision Level: First Edition 1991

Supersedence: NA

Applicability: This document is applicable to Canadian EMC measurement facility personnel responsible for measurement of disturbance characteristics of ISM RF equipment.

Purpose: The purpose of this document is to provide limits and methods of measuring electromagnetic disturbance characteristics of ISM RF equipment.

Comments: This standard is based on CISPR 11 1990.

Document #: C108.8-M 1983

Title: *Electromagnetic Emissions from Data Processing Equipment and Electronic Office Machines*

Key Word(s): Data Processing Equipment

Effective Date: 1983

Revision Level: Reaffirmed 1989
Amendments 1-5 Sept 1983

Supersedence: NA

Applicability: This document is applicable to Canadian EMC measurement facility personnel responsible for measurement of disturbance characteristics of data processing equipment and electronic office machines.

Purpose: The purpose of this document is to provide methods of measuring electromagnetic emissions from data processing equipment and electronic office machines.

Comments: None

Document #: CAN/CSA-C108.9-M91

Title: *Sound and Television Broadcasting Receivers and Associated Equipment Limits and Methods of Measurement of Immunity Characteristics*

Key Word(s): TV

Effective Date: 1991

Revision Level: First Edition 1991

Supersedence: NA

Applicability: This document is applicable for use by Canadian EMC measurement facility personnel responsible for determining EMI immunity characteristics of sound and television receivers and associated equipment.

Purpose: The purpose of this document is to provide limits and methods of measuring immunity characteristics of sound and television broadcasting receivers and associated equipment.

Comments: None

Document #: RIR-2

Title: *Radio Interference Regulations of Canada*

Key Word(s): Radio Interference Regulations

Effective Date: 1992

Revision Level: First Edition

Supersedence: NA

Applicability: This document is applicable for use by the Canadian EMC community.

Purpose: The purpose of this document is to provide a listing of Canadian EMC regulations.

Comments: None

8.5 GERMAN EMC-RELATED STANDARDS

Summaries of EMC-related German standards are presented in this subsection.

Document #:	VDE 871
Title:	<i>Limits of Radio Interference from RF Apparatus and Installations Part 1: Radio Interference Suppression and RF Equipment for Industrial, Scientific and Medical (ISM) and Similar Purposes Part 2: Data Processing Equipment and Electronic Office Machines</i>
Key Word(s):	ISM
Effective Date:	June 1978
Revision Level:	Amendment 2 Sep 1987 Amendment 1 Aug 1985 First Edition Jun 1978
Supersedence:	NA
Applicability:	This document is applicable for use by German industry to demonstrate EMC compliance with government rules.
Purpose:	The purpose of this document is to provide limits and test procedures for measuring narrowband emissions from sources whose fundamental frequency is greater than 10 kHz. It defines limits up to 18 GHz.
Comments:	None

Document #:	VDE 875
Title:	<i>Specification for the Radio Interference Suppression of Appliances, Machines and Installations of Rated Frequencies, Part 1: Household Appliances, Part 2: Fluorescent Devices, Part 3: Electrical Devices other than Household Appliances and Fluorescent Devices</i>
Key Word(s):	Household Appliances
Effective Date:	December 1988
Revision Level:	First Edition Dec 1988
Supersedence:	NA
Applicability:	This document is applicable for use by German industry to demonstrate EMC compliance with government rules.
Purpose:	The purpose of this document is to provide requirements for suppressing radio interference from appliances, machines and installations.
Comments:	Parts 1 and 2 of this standard are harmonized with European Standards EN 55014 and EN 55015.

Document #: VDE 876

Title: *Radio Interference Measuring Apparatus*
Part 1: Radio Interference Receiver with Weighted Indication and Accessories
Part 2: Disturbance Analyzer for the Automatic Assessment of Interference Produced by Switching Operations
Part 3: Current Probes for Measuring Radio Interference

Key Word(s): Radio Interference Measurement

Effective Date: September 1978

Revision Level: Amendment 1 Jun 1980
 First Edition Sep 1978

Supersedence: NA

Applicability: This document is applicable for use by German measurement facilities in selecting interference measurement apparatus approved by the German government.

Purpose: This purpose of this document is to designate appropriate measuring apparatus for interference measurements.

Comments: None

Document #: VDE 877

Title: *Measurement of Radio Interference*
Part 1: Measurement of Radio Interference Voltages
Part 2: Measurement of Radio Interference Field Strengths
Part 3: Measurement of Radio Interference Power on Leads

Key Word(s): Radio Interference Measurement

Effective Date: Part 1 - March 1989
 Part 2 - February 1985
 Part 3 - April 1980

Revision Level: First Edition

Supersedence: NA

Applicability: This document is applicable for use by German measurement facilities in measurement of radio interference.

Purpose: The purpose of this document is to provide procedures for measuring radio interference voltages, radio interference field strengths and radio interference on power leads.

Comments: For measurement of equipment such as home or business computers, the entire system is placed on a table top. The procedures used to position cables are described in CISPR Publication 22 (1985).

Document #: VDE 878

Title: *RF Suppression of Telecommunications Systems, Parts 1 and 2*

Key Word(s): Telecommunications Systems

Effective Date: Part 1 - 12 January 1986
Part 2 - 7 August 1988

Revision Level: First Edition

Supersedence: NA

Applicability: This document is applicable to EMC specialists responsible for suppressing interference in telecommunications systems in Germany.

Purpose: The purpose of this document is to provide methods for suppressing interference in telecommunications systems.

Comments: None

8.6 UNITED KINGDOM EMC-RELATED STANDARDS

Summaries of EMC-related United Kingdom standards are presented in this subsection.

Document #: BS 613 1977

Title: *Specification for Components and Filter Units for Electromagnetic Interference Suppression*

Key Word(s): Electromagnetic Interference Suppression

Effective Date: 1977

Revision Level: First Edition 1977

Supersedence: NA

Applicability: This standard is applicable for use by EMC specialists in the UK.

Purpose: The purpose of this standard is to specify components and filter units for EMI suppression in the UK.

Comments: None

Document #: BS 727 1983

Title: *Specification for Radio Interference Measurement Apparatus*

Key Word(s): Radio Interference Measurement Apparatus

Effective Date: 1983

Revision Level: Amendment 1 1983
First Edition 1983

Supersedence: NA

Applicability: This standard is applicable for use by EMC measurement personnel in the UK.

Purpose: The purpose of this standard is to define the characteristics and performance of apparatus for measuring radio interference voltages and fields in the frequency range from 0.015 to 1000 MHz.

Comments: This standard is a common standard with CISPR 16.

Document #: BS 800 1988

Title: *Specification for Radio Interference Limits and Measurements for Household Appliances, Portable Tools and Other Electrical Equipment Causing Similar Types of Interference*

Key Word(s): Household Appliances

Effective Date: 1988

Revision Level: Amendment 1 29 Jun 1990
First Edition 1988

Supersedence: NA

Applicability: This standard is applicable for use by EMC measurement personnel in the UK.

Purpose: The purpose of this standard is to specify limits of the magnitude of radio-noise terminal voltages and radio-noise fields throughout the frequency ranges of 200 to 1605 kHz, and 40 to 70 MHz.

Comments: This standard is common with CISPR 14.

Document #: BS 833 1985

Title: *Radio Interference Limits and Measurements for the Electrical Ignition Systems of Internal Combustion Engines*

Key Word(s): Ignition Systems

Effective Date: 1985

Revision Level: Second Edition 1985
First Edition 1970

Supersedence: NA

Applicability: This standard is applicable for use by measurement personnel for measurement of electrical ignition systems in the UK.

Purpose: The purpose of this standard is to provide radiation limits and measurement methods for use in determining compliance of electrical ignition systems with established RF interference standards.

Comments: None

Document #: BS 905 1985

Title: *Sound and Television Broadcast Receivers and Associated Equipment Electromagnetic Compatibility Part 1: Specification for Limits of Radio Interference (CISPR 13) Part 2: Specification for Limits of Immunity (CISPR 20)*

Key Word(s): TV, FM

Effective Date: Part 1 1985
Part 2 1985

Revision Level: Second Edition 1985
First Edition 1969

Supersedence: NA

Applicability: This standard is applicable for use by measurement personnel in determining the compliance of sound and television broadcast receivers in the UK with established EMC standards.

Purpose: The purpose of this standard is to provide limits of permissible radio interference and method of measurement for broadcast television and FM sound reception.

Comments: None

Document #: BS 1597 1985

Title: *Specification for Limits and Methods of Measurement of Electromagnetic Interference Generated by Marine Equipment and Installations*

Key Word(s): Marine Equipment

Effective Date: 1985

Revision Level: Second Edition 1985
First Edition 1975

Supersedence: NA

Applicability: This standard is applicable for use by measurement personnel in determination of interference generated by marine equipment and installations used by the UK.

Purpose: The purpose of this standard is to provide limits and methods of measurement for EMI generated by the electrical and electronic equipment of marine shipboard installations.

Comments: None

Document #: BS 4727 1976

Title: *Glossary of Electrotechnical, Power Telecommunications, Electronics, Lightning and Colour Terms Part 1: Group 09 Radio Interference Technology*

Key Word(s): Radio Interference Glossary

Effective Date: 1976

Revision Level: First Edition 1976

Supersedence: NA

Applicability: Part 1 of this standard is applicable for use by EMC specialists in the UK.

Purpose: The purpose of this standard is to provide a standard list of terms for use in interference analysis.

Comments: This is a common document with IEC 50: Chapter 902.

Document #: BS 4809 1981

Title: *Radio Interference Limits and Measurements for Radio Frequency Heating Equipment*

Key Word(s): Heating Equipment

Effective Date: 1981

Revision Level: First Edition 1981

Supersedence: NA

Applicability: This standard is applicable for use by measurement personnel in measurements of emissions from heating equipment in the UK.

Purpose: The purpose of this standard is to provide limits and measurement methods for RF heating equipment.

Comments: This standard is common with CISPR 11.

Document #: BS 5049 1981

Title: *Methods of Measurement of Radio Noise From Power Supply Apparatus for Operation at 1 kV and Above*

Key Word(s): Power Supplies

Effective Date: 1981

Revision Level: First Edition 1981

Supersedence: NA

Applicability: This standard is applicable for use by measurement personnel in measurement of radio noise from power supply apparatus in the UK.

Purpose: The purpose of this standard is to provide methods of measuring radio noise from power supply apparatus.

Comments: This standard is common with CISPR 18.

Document #: BS 5260 1981

Title: *Code of Practice for Radio Interference Suppression on Marine Installations*

Key Word(s): Marine Installations

Effective Date: 1981

Revision Level: First Edition 1981

Supersedence: NA

Applicability: This standard is applicable for use by EMC analysts involved with interference suppression on marine installations in the UK.

Purpose: The purpose of this standard is to provide a code of practice for radio interference suppression methods in marine installations.

Comments: None

Document #: BS 5394 1988

Title: *Specification For Limits and Methods of Measurement of Radio Interference Characteristics of Florescent Lamps and Luminaries*

Key Word(s): Florescent Lamps

Effective Date: 1988

Revision Level: First Edition 1988

Supersedence: NA

Applicability: This standard is applicable for use by measurement personnel for measurement of radio interference characteristics of florescent lamps and luminaries in the UK.

Purpose: The purpose of this standard is to provide limits and methods of measuring radio interference characteristics of florescent lamps and luminaries.

Comments: This standard is common with CISPR 15.

Document #: BS 5406 1988

Title: *The Limitations of Disturbances in Electricity Supply Networks Caused by Domestic and Similar Appliances Equipped With Electronic Devices*

Key Word(s): Electrical Appliances

Effective Date: 1988

Revision Level: First Edition 1988

Supersedence: NA

Applicability: This standard is applicable to EMC specialists responsible for checking levels of disturbances in electricity supply networks caused by domestic and similar appliances equipped with electronic devices in the UK.

Purpose: The purpose of this standard is to provide limits for measurement of disturbances in electricity supply networks.

Comments: None

Document #: BS 5602 1978

Title: *Code of Practice for Abatement of Radio Interference from Overhead Power Lines*

Key Word(s): Power Lines

Effective Date: 1978

Revision Level: First Edition 1978

Supersedence: NA

Applicability: This standard is applicable to EMC personnel responsible for abatement of radio interference from overhead power lines in the UK.

Purpose: The purpose of this standard is to provide a code of practice for abatement of radio interference from overhead power lines.

Comments: This is a common document with CISPR 18.

Document #: BS 5783 1984

Title: *Code of Practice for Handling of Electrostatic Devices*

Key Word(s): Electrostatic Devices

Effective Date: 1984

Revision Level: First Edition 1984

Supersedence: NA

Applicability: This document is applicable for use of personnel handling electrostatic devices in the UK.

Purpose: The purpose of this document is to provide a code of practice for handling electrostatic devices.

Comments: None

Document #: BS 6021 1982

Title: *Fixed Capacitors for Use In Electronic Equipment Part 3: Specification for Fixed Capacitors for Radio Interference Suppression Selection of Methods of Test and General Requirements*

Key Word(s): Fixed Capacitors

Effective Date: 1982

Revision Level: First Edition 1982

Supersedence: NA

Applicability: This standard is applicable for use by EMC specialists selecting interference suppression components, methods of test and general requirements in the UK.

Purpose: The purpose of this standard is to provide specifications for components, methods of test and general requirements for interference suppression in electronic equipment.

Comments: This is a common standard with IEC 384-14.

Document #: BS 6299 1982

Title: *Method of Measurement of the Suppression Characteristics of Passive Radio Interference Filters and Suppression Components*

Key Word(s): Passive Radio Interference Filters and Suppression Components

Effective Date: 1982

Revision Level: First Edition 1982

Supersedence: NA

Applicability: This standard is applicable for EMC specialists selecting passive radio interference filters and suppression components in the UK.

Purpose: The purpose of this standard is to provide methods of measuring the suppression characteristics of passive radio and suppression components for radio interference.

Comments: This standard is common with CISPR 17.

Document #: BS 6345 1983

Title: *Methods for Measurement of Radio Interference Terminal Voltage of Lightning Equipment*

Key Word(s): Lightning Equipment

Effective Date: 1983

Revision Level: First Edition 1983

Supersedence: NA

Applicability: This standard is applicable for EMC specialists responsible for measurement of terminal voltage of lightning equipment in the UK.

Purpose: The purpose of this standard is to provide methods of measuring radio interference terminal voltage of lightning equipment.

Comments: This is a common standard with CISPR 15.

Document #: BS 6527 1988

Title: *Specification for Limits and Measurements of Radio Interference Characteristics of Information Technology Equipment*

Key Word(s): Information Technology Equipment

Effective Date: 1988

Revision Level: First Edition 1988

Supersedence: NA

Applicability: This standard is applicable to EMC specialists responsible for measurements of radio interference characteristics of information technology equipment in the UK.

Purpose: The purpose of this standard is to provide specifications for limits and methods of measuring radio interference characteristics of information technology equipment.

Comments: This standard is common with CISPR 22.

Document #: BS 6651 1985

Title: *The Protection of Structures Against Lightning*

Key Word(s): Lightning

Effective Date: 1985

Revision Level: First Edition 1985

Supersedence: NA

Applicability: This standard is applicable to EMC specialists responsible for protection of structures against lightning in the UK.

Purpose: The purpose of this document is to provide methods for protection of structures against lightning.

Comments: None

Document #: BS 6656 1986

Title: *Prevention of Inadvertent Ignition of Flammable Atmospheres by Radio Frequency Radiation*

Key Word(s): HERF

Effective Date: 1986

Revision Level: First Edition 1986

Supersedence: NA

Applicability: This standard is applicable for use by personnel responsible for EMC and safety in prevention of inadvertent ignition of flammable atmospheres by RF radiation in the UK.

Purpose: The purpose of this standard is to provide procedures for prevention of inadvertent ignition of flammable atmosphere by RF radiation.

Comments: None

Document #: BS 6657 1986

Title: *Prevention of Inadvertent Initiation of Electro-Explosive Devices by Radio Frequency Radiation*

Key Word(s): HERO

Effective Date: 1986

Revision Level: First Edition 1986

Supersedence: NA

Applicability: This standard is applicable for use by personnel responsible for EMC and safety in prevention of inadvertent initiation of electro-explosive devices by RF radiation in the UK.

Purpose: The purpose of this standard is to provide procedures for prevention of inadvertent initiation of electro-explosive devices by RF radiation.

Comments: None

Document #: BS 6667 1985

Title: *EMC Requirements for Industrial Process Control Instrumentation*

Key Word(s): Industrial Process Control Instrumentation

Effective Date: 1985

Revision Level: First Edition 1985

Supersedence: NA

Applicability: This standard is applicable for EMC specialists responsible for industrial process control instrumentation in the UK.

Purpose: The purpose of this standard is to provide EMC requirements for industrial process control instrumentation.

Comments: This is a common standard with IEC 801.

Document #: BS 6839 1987

Title: *Mains Signalling Equipment Part 1: Specification for Communication and Interference Limits and Measurements Part 2: Specifications for Interfaces*

Key Word(s): Mains Signalling Equipment

Effective Date: 1987

Revision Level: First Edition 1987

Supersedence: NA

Applicability: This standard is applicable for use by EMC specialists responsible for communication interference limits and measurements and specifications for interfaces in mains signalling equipment in the UK.

Purpose: The purpose of this standard is to provide specifications for communication and interference limits and measurements, and interface in mains signalling equipment.

Comments: None

Document #: DD 158 1987

Title: *Filters for Mains Signalling Systems*

Key Word(s): Mains Signalling Systems Filters

Effective Date: 1987

Revision Level: First Edition 1987

Supersedence: NA

Applicability: This standard is applicable for use by EMC specialists responsible for filters for mains signalling systems in the UK.

Purpose: The purpose of this standard is to provide specifications for filters for mains signalling systems.

Comments: None

Document #: 3G 100 1980

Title: *Specifications for General Requirements for Equipment for Use in Aircraft Part 4: Section 2, Electromagnetic Interference at Radio and Audio Frequencies*

Key Word(s): Aircraft EMI

Effective Date: 1980

Revision Level: First Edition 1980

Supersedence: NA

Applicability: This standard is applicable for EMC specialists responsible for EMC at radio and audio frequencies on aircraft in the UK.

Purpose: The purpose of this standard is to provide specifications for general requirements involving interference at radio and audio frequencies on aircraft.

Comments: None

SECTION 9

INTERNATIONAL EMC-RELATED STANDARDIZATION DOCUMENTS

9.1 INTRODUCTION

The standardization documents in this section are developed by international organizations. These documents include standards, recommendations, reports, methods of measurement, requirements, rules, procedures, and limits of interference. These international standards become increasingly important as the current world trade expansion continues.

Three of the international standards organizations that play an important role in EMC are described in the following paragraphs.

9.1.1 International Electrotechnical Commission (IEC)

Standardization with respect to electrical and electronic engineering is the goal of the IEC. The IEC was founded in 1906 to promote international cooperation in the electrotechnical industry. The IEC has originated a multi-language vocabulary with more than 100,000 terms, originated the "International System" (S.I.) of units of measurement, and established worldwide standards for electrical equipment and installation. Standardization documents of the IEC that play an important role in EMC are described in Section 9.2 and listed in Table 9-1.

9.1.2 International Radio Consultative Committee (CCIR)

The CCIR is part of the International Telecommunications Union (ITU) and was established to promote standardized radio communications on a worldwide basis. Reports and recommendations published by the CCIR have formed the basis of many radio-communications standards. Standardization documents of the CCIR that play an important role in EMC are described in Section 9.3 and listed in Table 9-2.

9.1.3 International Special Committee on Radio Interference (CISPR)

The Comité Internationale Spécial des Perturbations Radioélectriques (International Special Committee on Radio Interference) was founded in 1934. It promotes agreement on many aspects of radio interference (such as methods of measurement and limits for conducted or radiated interference from many different apparatus and appliances and their statistical interpretation) with the primary objectives of fostering satisfactory reception of radio and television broadcasting services and of facilitating international trade. Standardization documents of the CISPR that play an important role in EMC are described in Section 9.4 and listed in Table 9-3.

Table 9-1. IEC EMC-Related Standards

IEC 50 Chapter 161-90	<i>International Electrotechnical Vocabulary Chapter 161: Electromagnetic Compatibility</i>
IEC 107-87	<i>Recommended Methods of Measurements on Receivers for Television Broadcast Transmissions, Part 1: General Considerations Electrical Measurements Other Than Those at Audio-Frequencies, Second Edition</i>
IEC 215-87	<i>Safety Requirements for Radio Transmitting Equipment</i>
IEC-244 PT 1-68	<i>Methods of Measurement for Radio Transmitters Part 1: General Conditions of Measurement Frequency, Output Power, and Power Consumption</i>
IEC 244 PT 2-69	<i>Methods of Measurement for Radio Transmitters Part 2: Bandwidth, Out-of-Band Power, and Power of Non-Essential Oscillations</i>
IEC 244 PT 3-72	<i>Methods of Measurement for Radio Transmitters Part 3: Wanted and Unwanted Modulation, Unwanted Modulation Including Hum and Noise Modulation, First Edition</i>
IEC 244 PT 4-73	<i>Methods of Measurement for Radio Transmitters Part 4: Amplitude/Frequency Characteristics and Non-Linearity Distortion in Transmitters for Radiotelephony and Sound Broadcasting, First Edition</i>
IEC 244 PT 5-92	<i>Methods of Measurement for Radio Transmitters Part 5: Performance Characteristics of Television Transmitters, Second Edition</i>
IEC 244 PT 6-76	<i>Methods of Measurement for Radio Transmitters Part 6: Cabinet Radiation at Frequencies Between 130 kHz and 1 GHz, First Edition</i>
IEC 244 PT 7-79	<i>Methods of Measurement for Radio Transmitters Part 7: Cabinet Radiation at Frequencies Above 1 GHz, First Edition</i>
IEC 244 PT 8-93	<i>Methods of Measurements of Radio Transmitters Part 8: Performance Characteristics of Vestigial Sideband Demodulators Used for Testing Television Transmitters or Transposers</i>
IEC 244 PT 9-93	<i>Methods of Measurement of Radio Transmitters Part 9: Performance Characteristics for Television Transposers, Second Edition</i>
IEC 244 PT 10-86	<i>Methods of Measurement of Radio Transmitters Part 10: Methods of Measurement for Television Transmitters and Transposers Employing Insertion Test Signals, First Edition</i>
IEC 244 PT 11-89	<i>Methods of Measurement for Radio Transmitters Part 11: Transposers for FM Sound Broadcasting, First Edition</i>
IEC 244 PT 12-1-89	<i>Methods of Measurement for Radio Transmitters Part 12-1: Guideline for Drawing Up Descriptive Leaflets for Transmitters and Transposers for Sound and Television Broadcasting-Characteristics to be Specified, First Edition</i>
IEC 244 PT 12-2-89	<i>Methods of Measurement for Radio Transmitters Part 12-2: Guideline for Drawing Up Descriptive Leaflets for Transmitters and Transposers for Sound and Television - Specification Sheets, First Edition</i>
IEC 244 PT 13-91	<i>Methods of Measurements for Radio Transmitters Part 13: Performance Characteristics for FM Sound Broadcasting, First Edition</i>
IEC 315 PT 1-88	<i>Methods of Measurement on Radio Receivers for Various Classes of Emission Part 1: General Considerations and Methods of Measurement, Including Audio-Frequency Measurements, Second Edition</i>
IEC 315 PT 3-89	<i>Methods of Measurement on Radio Receivers for Various Classes of Emission Part 3: Receivers for Amplitude Modulated Sound - Broadcasting Emissions, Second Edition</i>
IEC 315 PT 4-82	<i>Methods of Measurement on Radio Receivers for Various Classes of Emission Part 4: Radio Frequency Measurements on Receivers for Frequency Modulated Sound - Broadcasting Emissions, First Edition</i>

Table 9-1. IEC EMC-Related Standards - Continued

IEC 315 PT 5-71	<i>Methods of Measurement on Radio Receivers for Various Classes of Emission Part 5: Specialized Radio - Frequency Measurements, Measurement of Frequency - Modulated Receivers of the Response to Impulsive Interference Recommendations, First Edition</i>
IEC 315 PT 6-91	<i>Methods of Measurement on Radio Receivers for Various Classes of Emissions Part 6: General Purpose Communication Receivers, First Edition</i>
IEC 315 PT 8-75	<i>Methods of Measurement on Radio Receivers for Various Classes of Emissions Part 8: Radio Frequency Measurements on Professional Receivers for Frequency - Modulated Telegraphy, Systems First Edition</i>
IEC 437-73	<i>Radio Interference Test on High Voltage Insulators, First Edition</i>
IEC 469 PT 1-87	<i>Pulse Techniques and Apparatus Part 1: Pulse Terms and Definitions, Second Edition</i>
IEC 469 PT 2-87	<i>Pulse Techniques and Apparatus Part 2: Pulse Measurement and Analysis, General Considerations, Second Edition</i>
IEC 489 PT 1-83	<i>Methods of Measurement for Radio Equipment Used in the Mobile Services Part 1: General Definitions and Standard Conditions of Measurement, Second Edition</i>
IEC 489 PT 2-91	<i>Methods of Measurement for Radio Equipment Used in the Mobile Services Part 2: Transmitters Employing A3E, F3E or G3E Emissions, Second Edition</i>
IEC 489 PT 3-88	<i>Methods of Measurement for Radio Equipment Used in the Mobile Service Part 3: Receivers for A3E or F3E Emissions, Second Edition</i>
IEC 489 PT 4-91	<i>Methods of Measurement for Radio Equipment Used in the Mobile Services Part 4: Transmitters Employing Single Sideband Emissions (R3E, H3E or J3E), Second Edition</i>
IEC 489 PT 5-87	<i>Methods of Measurement for Radio Equipment Used in the Mobile Services Part 5: Receivers Employing Single Sideband Techniques (R3E, H3E or J3E), Second Edition</i>
IEC 489 PT 6-87	<i>Methods of Measurement for Radio Equipment Used in the Mobile Services Part 6: Selective-Calling and Data Equipment, Second Edition</i>
IEC 489 PT 8-84	<i>Method of Measurement for Radio Equipment Used in the Mobile Services Part 8: Methods of Measurements for Antennas, First Edition</i>
IEC 510 PT 1-75	<i>Methods of Measurement for Radio Equipment Used in Satellite Earth Stations Part 1: Measurements Common to Sub-Systems and Combinations of Sub-Systems, First Edition</i>
IEC 510 PT 2-78	<i>Methods of Measurement for Radio Equipments Used in Satellite Earth Stations Part 2: Measurements for Subsystems, First Edition</i>
IEC 510 PT 3-80	<i>Methods of Measurement for Radio Equipment Used in Satellite Earth Station Part 3: Methods of Measurement for Combination of Sub-Systems, First Edition</i>
IEC 533-77	<i>Electromagnetic Compatibility of Electrical and Electronic Installations in Ships, First Edition</i>
IEC 601 PT 1-2-93	<i>Medical Electrical Equipment Part 1: General Requirements for Safety 2. Collateral Standard: Electromagnetic Compatibility - Requirements and Tests, First Edition</i>
IEC 657-79	<i>Non-Ionizing Radiation Hazards in the Frequency Range from 10 MHz to 300,000 MHz, First Edition</i>
IEC 801 PT 1-84	<i>Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment Part 1: General Introduction</i>
IEC 801 PT 2-91	<i>Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment Part 2: Electrostatic Discharge Requirements, Second Edition</i>
IEC 801 PT 3-84	<i>Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment Part 3: Radiated Electromagnetic Field Requirements, First Edition</i>
IEC 801 PT 4-88	<i>Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment, Part 4: Electrical Fast Transient/Burst Requirements, First Edition</i>

Table 9-2. CCIR EMC Recommendations and Reports

CCIR Rec. 239-2, 1978	<i>Spurious Emissions from Sound and Television Broadcast Receivers</i>
CCIR Rec. 329-6, 1990	<i>Spurious Emissions</i>
CCIR Rec. 378-4, 1986	<i>Field-Strength Measurements at Monitoring Stations and Expeditious Methods for Making these Measurements</i>
CCIR Rec. 443-1 1990	<i>Bandwidth Measurements at Monitoring Stations</i>
CCIR Rep. 258-5, 1990	<i>Man-made Radio Noise</i>

Table 9-3. CISPR EMC Standards

CISPR 7-1969	<i>Recommendations of the CISPR</i>
CISPR 8-1969	<i>Reports and Study Questions of the CISPR</i>
CISPR 9-1978	<i>CISPR Limits of Radio Interference and Leakage Currents According to CISPR and National Regulations</i>
CISPR 10-1989	<i>Organization, Rules, and Procedures of the CISPR</i>
CISPR 11-1990	<i>Limits and Methods of Measurement of Electromagnetic Disturbance Characteristics of Industrial, Scientific, and Medical (ISM) Radio Frequency Equipment (Excluding Surgical; Diathermy Apparatus)</i>
CISPR 12-1990	<i>Limits and Methods of Measurement of Radio Interference Characteristics of Ignition Systems of Motor Vehicles and Other Devices</i>
CISPR 13-1990	<i>Limits and Methods of Measurement of Radio Interference Characteristics of Sound and Television Receivers</i>
CISPR 14-1990	<i>Limits and Methods of Measurement of Radio Interference Characteristics of Household Electrical Appliances, Portable Tools, and Similar Electrical Apparatus</i>
CISPR 15-1985	<i>Limits and Methods of Measurement of Radio Interference of Fluorescent Lamps and Luminaires</i>
CISPR 16-1987	<i>Specification for Radio-Interference Measuring Apparatus and Measurement Methods, Second Edition</i>
CISPR 17-1981	<i>Methods of Measurement of the Suppression Characteristics of Passive Radio Interference Filters and Suppression Components</i>
CISPR 18-1-1982	<i>Radio Interference Characteristics of Overhead Power Lines and High Voltage Equipment, Description of Phenomena, Part 1</i>
CISPR 18-2-1986	<i>Radio Interference Characteristics of Overhead Power Lines and High Voltage Equipment Part 2: Methods of Measurement and Procedures for Determining Limits</i>
CISPR 18-3-1986	<i>Radio Interference Characteristics of Overhead Power Lines and High Voltage Equipment Part 3: Code of Practice for Minimizing the Generation of Radio Noise</i>
CISPR 19-1983	<i>Guidance on the Use of Substitution Method for Measurement of Radiation from Microwave Ovens for Frequencies Above 1 GHz</i>
CISPR 20-1985	<i>Measurement of the Immunity of Sound and Television Broadcast Receivers and Associated Equipment in the Frequency Range from 1.5 to 30 MHz by the Current Injection Method, Guidance on Immunity Requirements for the Reduction of Interference Caused by Transmitters in the Frequency Range of 26 MHz to 30 MHz</i>
CISPR 21-1985	<i>Interference to Mobile Radio Communications in the Presence of Impulsive Noise: Method of Judging Degradation and Measures to Improve Performance</i>
CISPR 22-1985	<i>Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment</i>
CISPR 23-1987	<i>Determination of Limits of Radio Interference for Industrial Scientific and Medical Equipment</i>

9.2 IEC EMC-RELATED STANDARDS

Summaries of IEC EMC-related standards are presented in this subsection.

Document #:	IEC 50 Chapter 161-90
Title:	<i>International Electrotechnical Vocabulary Chapter 161: Electromagnetic Compatibility</i>
Key Word(s):	EMC
Effective Date:	1990
Revision Level:	First Edition
Supersedence:	NA
Applicability:	This document is applicable for use in the international EMC community.
Purpose:	The purpose of this document is to standardize the electrotechnical EMC vocabulary for international use.
Comments:	None

Document #:	IEC 107-87
Title:	<i>Recommended Methods of Measurements on Receivers for Television Broadcast Transmissions, Part I: General Considerations Electrical Measurements Other Than Those at Audio-Frequencies, Second Edition</i>
Key Word(s):	TV
Effective Date:	1987
Revision Level:	Second Edition, Amendment 1
Supersedence:	This document supersedes IEC 107-60.
Applicability:	This document is applicable for use in the international EMC community.
Purpose:	The purpose of this document is to recommend methods of measurement on receivers for television broadcast transmissions.
Comments:	There are six parts to this document. Part 1 General Considerations 1987 Part 2 Electrical Acoustical Measurements 1980 Part 3 Multichannel Sound 1988 Part 4 Multichannel sound, Two Carrier 1988 Part 5 NICAM Two Channel Digital Sound 1992 Part 6 Non Standard Conditions 1989

Document #: IEC 215-87

Title: *Safety Requirements for Radio Transmitting Equipment*

Key Word(s): Safety

Effective Date: 1993

Revision Level: Amendment 2 1993
 Amendment 1 1990
 Third Edition 1987
 Second Edition 1978
 First Edition 1967

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to recommend safety requirements for radio transmitting equipment.

Comments: None

Document #: IEC-244 PT 1-68

Title: *Methods of Measurement for Radio Transmitters*
Part 1: General Conditions of Measurement Frequency, Output Power, and Power Consumption

Key Word(s): Measurement

Effective Date: 1989

Revision Level: Amendment 2 1989
 Amendment 1 1973
 Supplement A 1968

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to recommend general conditions for measurement of transmitter frequency, output power and power consumption.

Comments: None

Document #: IEC 244 PT 2-69

Title: *Methods of Measurement for Radio Transmitters
Part 2: Bandwidth, Out-of-Band Power, and Power of Non-Essential Oscillations*

Key Word(s): Measurement

Effective Date: 1974

Revision Level: Amendment 1 1974
Amendment 1 to Sup A 1973
First Edition, Sup A 1969

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this part of the document is to recommend methods of measuring transmitter bandwidth, out-of-band power, and power of non-essential oscillations.

Comments: None

Document #: IEC 244 PT 3-72

Title: *Methods of Measurement for Radio Transmitters
Part 3: Wanted and Unwanted Modulation, Unwanted Modulation Including Hum and Noise Modulation, First Edition*

Key Word(s): Measurement

Effective Date: 1972

Revision Level: Supplement B 1972
Supplement A 1971

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to recommend methods of measuring transmitter wanted and unwanted modulation, including hum and noise modulation.

Comments: None

Document #: IEC 244 PT 4-73

Title: *Methods of Measurement for Radio Transmitters
Part 4: Amplitude/Frequency Characteristics and Non-Linearity Distortion in Transmitters for Radiotelephony and Sound Broadcasting, First Edition*

Key Word(s): Measurement

Effective Date: 1976

Revision Level: Supplement A 1976
Original 1973

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to recommend methods of measuring transmitter amplitude/frequency characteristics and non-linear distortion in transmitters for radiotelephony and sound broadcasting.

Comments: None

Document #: IEC 244 PT 5-92

Title: *Methods of Measurement for Radio Transmitters
Part 5: Performance Characteristics of Television Transmitters, Second Edition*

Key Word(s): TV, Measurement

Effective Date: 1992

Revision Level: Second Edition 1992
Supplement 1-3 1977
First Edition 1971

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to recommend methods of measuring performance characteristics of television transmitters.

Comments: None

Document #: IEC 244 PT 6-76

Title: *Methods of Measurement for Radio Transmitters
Part 6: Cabinet Radiation at Frequencies Between 130 kHz and 1 GHz, First Edition*

Key Word(s): Radiation Measurement

Effective Date: 1976

Revision Level: First Edition

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to recommend methods of measuring cabinet radiation at frequencies between 130 kHz and 1 GHz.

Comments: None

Document #: IEC 244 PT 7-79

Title: *Methods of Measurement for Radio Transmitters
Part 7: Cabinet Radiation at Frequencies Above 1 GHz, First Edition*

Key Word(s): Radiation Measurement

Effective Date: 1980

Revision Level: Supplement A 1980
First Edition 1979

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to recommend methods of measuring cabinet radiation at frequencies above 1 GHz.

Comments: None

Document #: IEC 244 PT 8-93

Title: *Methods of Measurements of Radio Transmitters
Part 8: Performance Characteristics of Vestigial Sideband Demodulators Used for Testing Television Transmitters or Transposers*

Key Word(s): TV, Measurement

Effective Date: 1993

Revision Level:	Second Edition	1993
	Amendment 1	1983
	First Edition	1980

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to recommend methods of measuring performance characteristics of vestigial sideband demodulators used for testing television transmitters or transposers.

Comments: None

Document #: IEC 244 PT 9-93

Title: *Methods of Measurement of Radio Transmitters
Part 9: Performance Characteristics for Television Transposers, Second Edition*

Key Word(s): Measurement

Effective Date: 1993

Revision Level:	Second Edition	1993
	First Edition	1982

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to recommend methods of measuring performance characteristics for television transposers.

Comments: None

Document #: IEC 244 PT 10-86

Title: *Methods of Measurement of Radio Transmitters
Part 10: Methods of Measurement for Television Transmitters and Transposers Employing Insertion
Test Signals, First Edition*

Key Word(s): TV, Measurement

Effective Date: 1986

Revision Level: First Edition 1986

Supersedence: NA

Applicability: The document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to recommend methods of measurements for television transmitters and transposers employing insertion test signals.

Comments: None

Document #: IEC 244 PT 11-89

Title: *Methods of Measurement for Radio Transmitters
Part 11: Transposers for FM Sound Broadcasting, First Edition*

Key Word(s): FM, Measurement

Effective Date: 1993

Revision Level: First Edition 1993

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to recommend methods of measurement for transposers for FM sound broadcasting.

Comments: IEC 244 PT 11-89 has also been published as a standard by the European Committee for Electrotechnical Standardization (CENELEC), identified as EN 60244-11:1993.

Document #: IEC 244 PT 12-1-89

Title: *Methods of Measurement for Radio Transmitters
Part 12-1: Guideline for Drawing Up Descriptive Leaflets for Transmitters and Transposers for Sound and Television Broadcasting-Characteristics to be Specified, First Edition*

Key Word(s): TV, Measurement

Effective Date: 1989

Revision Level: First Edition 1989

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide guidelines for drawing up descriptive leaflets for transmitters and transposers for sound and television broadcasting characteristics.

Comments: None

Document #: IEC 244 PT 12-2-89

Title: *Methods of Measurement for Radio Transmitters
Part 12-2: Guideline for Drawing Up Descriptive Leaflets for Transmitters and Transposers for Sound and Television - Specification Sheets, First Edition*

Key Word(s): Measurement, Transposers

Effective Date: 1989

Revision Level: First Edition 1989

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide guidelines for drawing up descriptive leaflets and specification sheets for transmitters and transposers for sound and television.

Comments: None

Document #: IEC 244 PT 13-91

Title: *Methods of Measurements for Radio Transmitters
Part 13: Performance Characteristics for FM Sound Broadcasting, First Edition*

Key Word(s): FM, Measurement

Effective Date: 1993

Revision Level: First Edition 1993

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide standard performance characteristics for FM sound broadcasting systems.

Comments: None

Document #: IEC 315 PT 1-88

Title: *Methods of Measurement on Radio Receivers for Various Classes of Emission
Part 1: General Considerations and Methods of Measurement, Including Audio-Frequency
Measurements, Second Edition*

Key Word(s): Measurement

Effective Date: Second Edition 1988
First Edition 1970

Revision Level: Second edition of IEC 315 Part 1, dated 1988, is a revision of the first edition, dated 1970, and includes Part 2 of IEC 315, dated 1971, which has been updated.

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide general considerations and methods of measurement, including audio-frequency measurements on radio receivers for various classes of emissions.

Comments: None

Document #: IEC 315 PT 3-89

Title: *Methods of Measurement on Radio Receivers for Various Classes of Emission
Part 3: Receivers for Amplitude Modulated Sound - Broadcasting Emissions, Second Edition*

Key Word(s): AM, Measurement

Effective Date: Second Edition 1989
First Edition 1971

Revision Level: The second edition of IEC 315 Part 3, dated 1989, is a revision of the first edition of IEC 315 Part 3, dated 1971.

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide methods of measurements of receivers for amplitude modulated broadcast emissions.

Comments: None

Document #: IEC 315 PT 4-82

Title: *Methods of Measurement on Radio Receivers for Various Classes of Emission
Part 4: Radio Frequency Measurements on Receivers for Frequency Modulated Sound - Broadcasting Emissions, First Edition*

Key Word(s): FM, Measurement

Effective Date: 1989

Revision Level: Amendment 1 1989
First Edition 1982

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide methods of measuring receivers for frequency modulated broadcast emissions.

Comments: None

Document #: IEC 315 PT 5-71

Title: *Methods of Measurement on Radio Receivers for Various Classes of Emission
Part 5: Specialized Radio - Frequency Measurements, Measurement of Frequency - Modulated
Receivers of the Response to Impulsive Interference Recommendations, First Edition*

Key Word(s): FM, Measurement

Effective Date: 1971

Revision Level: First Edition 1971

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide methods of measuring the response of frequency modulated receivers to impulsive interference.

Comments: None

Document #: IEC 315 PT 6-91

Title: *Methods of Measurement on Radio Receivers for Various Classes of Emissions
Part 6: General Purpose Communication Receivers, First Edition*

Key Word(s): Measurement

Effective Date: 1991

Revision Level: First Edition 1991

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide methods of measurement for general purpose communications receivers.

Comments: None

Document #: IEC 315 PT 8-75

Title: *Methods of Measurement on Radio Receivers for Various Classes of Emissions
Part 8: Radio Frequency Measurements on Professional Receivers for Frequency - Modulated
Telegraphy, Systems First Edition*

Key Word(s): Measurement

Effective Date: 1975

Revision Level: First Edition 1975

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide methods of measurement on professional receivers for frequency modulated telegraphy systems.

Comments: None

Document #: IEC 437-73

Title: *Radio Interference Test on High Voltage Insulators, First Edition*

Key Word(s): High-Voltage Insulators

Effective Date: 1973

Revision Level: First Edition 1973

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide a method for radio interference testing of high-voltage insulators.

Comments: None

Document #: IEC 469 PT 1-87

Title: *Pulse Techniques and Apparatus
Part 1: Pulse Terms and Definitions, Second Edition*

Key Word(s): Pulse Techniques

Effective Date: Second Edition 1987
 First Edition 1974

Revision Level: IEC 469 1-87 is a revision of IEC 469 1-74.

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide information on pulse apparatus and pulse techniques and provide a bibliography of pulse terms and definitions.

Comments: None

Document #: IEC 469 PT 2-87

Title: *Pulse Techniques and Apparatus Part 2: Pulse Measurement and Analysis, General Considerations,
Second Edition*

Key Word(s): Pulse Measurement

Effective Date: Second Edition 1987
 First Edition 1974

Revision Level: IEC 469 PT2-87 is a revision of IEC 469 PT2-74.

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide information on pulse measurement and analysis.

Comments: None

Document #: IEC 489 PT 1-83

Title: *Methods of Measurement for Radio Equipment Used in the Mobile Services Part I: General Definitions and Standard Conditions of Measurement, Second Edition*

Key Word(s): Land Mobile

Effective Date: Second Edition 1983
First Edition 1974

Revision Level: IEC 489 PT1-83 is a revision of IEC 489 PT1-74.

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide general definitions and standard conditions for measurement of radio equipment used in the mobile service.

Comments: None

Document #: IEC 489 PT 2-91

Title: *Methods of Measurement for Radio Equipment Used in the Mobile Services Part 2: Transmitters Employing A3E, F3E or G3E Emissions, Second Edition*

Key Word(s): Land Mobile

Effective Date: Second Edition 1991
First Edition 1974

Revision Level: IEC 489 PT2-91 is a revision of IEC 489 PT2-74.

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide methods of measurement for transmitters employing A3E, F3E, or G3E emissions in the mobile service.

Comments: None

Document #: IEC 489 PT 3-88

Title: *Methods of Measurement for Radio Equipment Used in the Mobile Service Part 3: Receivers for A3E or F3E Emissions, Second Edition*

Key Word(s): A3E Emissions, F3E Emissions, Mobile Service

Effective Date: Second Edition 1988
 First Edition 1979

Revision Level: IEC 489 PT3-88 is a revision of IEC 489 PT3-79.

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide methods of measurement for receivers for A3E or F3E emissions in the mobile service.

Comments: None

Document #: IEC 489 PT 4-91

Title: *Methods of Measurement for Radio Equipment Used in the Mobile Services Part 4: Transmitters Employing Single Sideband Emissions (R3E, H3E or J3E), Second Edition*

Key Word(s): Single Sideband

Effective Date: Second Edition 1991
 First Edition 1980

Revision Level: IEC 489 PT4-91 is a revision of IEC 489 PT4-80.

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide methods of measurement for transmitters employing R3E, H3E or J3E single sideband emissions in the mobile service.

Comments: None

Document #: IEC 489 PT 5-87

Title: *Methods of Measurement for Radio Equipment Used in the Mobile Services Part 5: Receivers Employing Single Sideband Techniques (R3E, H3E or J3E), Second Edition*

Key Word(s): Single Sideband

Effective Date: Second Edition 1987
 First Edition 1979

Revision Level: IEC 489 PT5-87 is a revision of IEC 489 PT5-79.

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide methods of measurement for receivers designed to receive single sideband emissions (R3E, H3E, or J3E) in the mobile service.

Comments: None

Document #: IEC 489 PT 6-87

Title: *Methods of Measurement for Radio Equipment Used in the Mobile Services Part 6: Selective-Calling and Data Equipment, Second Edition*

Key Word(s): Selective Calling

Effective Date: 1991

Revision Level: Amendment 2 1991
 Amendment 1 1989
 Second Edition 1987
 First Edition 1974

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide methods of measurement for selective calling and data equipment used in the mobile service.

Comments: IEC 489 PT6-87 has also been published as a standard by the European Committee for Electrotechnical Standardization (CENELEC), identified as HD 4666.6 S2:1992.

Document #: IEC 489 PT 8-84

Title: *Method of Measurement for Radio Equipment Used in the Mobile Services Part 8: Methods of Measurements for Antennas, First Edition*

Key Word(s): Antennas, Mobile Service

Effective Date: 1984

Revision Level: First Edition 1984

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide for methods of measurement for antennas used with radio equipment in the mobile service.

Comments: None

Document #: IEC 510 PT 1-75

Title: *Methods of Measurement for Radio Equipment Used in Satellite Earth Stations Part 1: Measurements Common to Sub-Systems and Combinations of Sub-Systems, First Edition*

Key Word(s): Satellite Earth Stations

Effective Date: Section 1 - General & Sup. A - 1980
Section 2 - RF Range - 1984
Section 3 - IF Range - 1988
Section 4 - Baseband - 1986
Section 5 - Noise Temperature - 1988

Revision Level: First Edition 1975

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide methods of measurement common to subsystems and combinations of subsystems for radio systems used in satellite earth systems.

Comments: None

Document #: IEC 510 PT 2-78

Title: *Methods of Measurement for Radio Equipments Used in Satellite Earth Stations Part 2: Measurements for Subsystems, First Edition*

Key Word(s): Satellite Earth Stations

Effective Date:

Section 1 - General	1978
Section 2 - Antennas & Feed	1978
Section 3 - Low Noise Amplifier	1989
Section 4 - Up/Down Converter	1988
Section 5 - Frequency Modulators	1992
Section 6 - Frequency Demodulators	1992
Section 7 - High Power Amplifier	1989

Revision Level: First Edition 1978

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide methods of measuring RF characteristics of subsystems for radio equipment used in satellite earth stations.

Comments: None

Document #: IEC 510 PT 3-80

Title: *Methods of Measurement for Radio Equipment Used in Satellite Earth Station Part 3: Methods of Measurement for Combination of Sub-Systems, First Edition*

Key Word(s): Satellite Earth Stations

Effective Date:

Section 1 - General	1980
Section 2 - Figure of Merit (G/T)	1980
Section 3 - Monochrome and Color TV	1988
Section 4 - Frequency Division Multiplex	1992

Revision Level: First Edition 1980

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide methods of measurement for combinations of subsystems for radio equipment used in satellite earth systems.

Comments: None

Document #: IEC 533-77

Title: *Electromagnetic Compatibility of Electrical and Electronic Installations in Ships, First Edition*

Key Word(s): Ships, EMC

Effective Date: 1977

Revision Level: First Edition 1977

Supersedence: NA

Applicability: This document is applicable for use in the international the EMC community.

Purpose: This purpose of this document is to provide information on EMC of electrical and electronic installations on ships.

Comments: None

Document #: IEC 601 PT 1-2-93

Title: *Medical Electrical Equipment Part 1: General Requirements for Safety 2. Collateral Standard: Electromagnetic Compatibility - Requirements and Tests, First Edition*

Key Word(s): Medical Equipment

Effective Date: 1993

Revision Level: First Edition 1993

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide requirements and tests for safety and EMC for medical electrical/electronic equipment.

Comments: EIC 601 PT1-2-93 is also published as a standard by the European Committee for Electrotechnical standardization (CENELEC) identified as EN 60601-1-2.

Document #: IEC 657-79

Title: *Non-Ionizing Radiation Hazards in the Frequency Range from 10 MHz to 300,000 MHz, First Edition*

Key Word(s): Radiation Hazards

Effective Date: 1979

Revision Level: First Edition 1979

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide information on non-ionizing radiation hazards in the frequency range from 10 MHz to 300 GHz.

Comments: None

Document #: IEC 801 PT 1-84

Title: *Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment Part 1: General Introduction*

Key Word(s): Industrial Process Equipment

Effective Date: 1993

Revision Level: First Edition 1993

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide information on EMC for industrial process measurement and control equipment.

Comments: IEC 801 PT1-84 has also been published as a standard by the European Committee for Electrotechnical Standardization (CENELEC) identified as EN 60801-2 1993.

Document #: IEC 801 PT 2-91

Title: *Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment Part 2: Electrostatic Discharge Requirements, Second Edition*

Key Word(s): Industrial Process Equipment

Effective Date: 1993

Revision Level: Second Edition 1993

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide EMC requirements for electrostatic discharge for industrial-process and control equipment.

Comments: IEC 801 PT2-91 has also been published as a standard by the European Committee for Electrotechnical Standardization (CENELEC) identified as EN 60801-2 93.

Document #: IEC 801 PT 3-84

Title: *Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment Part 3: Radiated Electromagnetic Field Requirements, First Edition*

Key Word(s): Industrial Process Equipment

Effective Date: 1984

Revision Level: First Edition 1984

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide methods for evaluating radiated field requirements for industrial-process measurement and control equipment.

Comments: None

Document #: IEC 801 PT 4-88

Title: *Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment, Part 4: Electrical Fast Transient/Burst Requirements, First Edition*

Key Word(s): Industrial Process Equipment

Effective Date: 1988

Revision Level: First Edition 1988

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide information and requirements relative to fast transients and/or bursts of energy in industrial-process measurement and control equipment.

Comments: None

9.3 CCIR EMC RECOMMENDATIONS AND REPORTS

Summaries of CCIR EMC recommendations and reports are presented in this subsection.

Document #: CCIR Rec. 239-2, 1978

Title: *Spurious Emissions from Sound and Television Broadcast Receivers*

Key Word(s): TV

Effective Date: 1990

Revision Level: Revised in CCIR Recommendations Volume 1, 1990

Supersedence: NA

Applicability: This recommendation is applicable for use by administrative radio conferences and radiocommunication services for efficient utilization of the RF spectrum and geostationary-satellite orbits.

Purpose: The purpose of this document is to recommend that the previous recommendations for spurious emissions established by the International Electrotechnical Commission (IEC) and the International Special Committee on Radio Interference (CISPR) be considered in new systems and that all possible means, compatible with economy, should be employed in the construction of receivers to reduce such spurious emissions.

Comments: None

Document #: CCIR Rec. 329-6, 1990

Title: *Spurious Emissions*

Key Word(s): Spurious Emissions

Effective Date: 1990

Revision Level: Revised in CCIR Recommendations Volume 1 1990.

Supersedence: NA

Applicability: This recommendation is applicable to users of the spectrum from 9.0 kHz to 17.3 GHz in the international EMC community.

Purpose: The purpose of this document is to recommend maximum spurious emission levels for transmitters in the frequency range from 9.0 kHz to 17.3 GHz.

Comments: None

Document #: CCIR Rec. 378-4, 1986

Title: *Field-Strength Measurements at Monitoring Stations and Expeditious Methods for Making these Measurements*

Key Word(s): Monitoring Stations

Effective Date: 1986

Revision Level: Revised in CCIR Recommendations Volume 1 1986.

Supersedence: NA

Applicability: This recommendation is applicable to stations participating in the international monitoring system that, as a part of their normal work, need to make expeditious measurements of the field strength of harmful interference.

Purpose: The purpose of this document is to recommend accuracies, measurement methods, and operational procedures to stations participating in the international monitoring system.

Comments: None

Document #: CCIR Rec. 443-1 1990

Title: *Bandwidth Measurements at Monitoring Stations*

Key Word(s): Monitoring Stations

Effective Date: 1990

Revision Level: Revised in CCIR Recommendations, Volume 1 1990.

Supersedence: NA

Applicability: This recommendation is applicable to stations participating in the international monitoring system and making measurements of signal bandwidths.

Purpose: The purpose of this document is to recommend methods of measuring signal bandwidths at monitoring stations.

Comments: None

Document #: CCIR Rep. 258-5, 1990

Title: *Man-made Radio Noise*

Key Word(s): Man-made Radio Noise

Effective Date: 1990

Revision Level: Revised in CCIR Reports Volume VI, 1990.

Supersedence: NA

Applicability: This report is applicable for use in the international EMC community.

Purpose: The purpose of this report is to describe man-made radio noise generated by different types of noise sources at any location. This information is used in the solution of telecommunications problems.

Comments: None

9.4 CISPR EMC STANDARDS

Summaries of CISPR EMC standards are presented in this subsection.

Document #: CISPR 7-1969

Title: *Recommendations of the CISPR*

Key Word(s): CISPR

Effective Date: 1975

Revision Level: Revision 7B 1975
Revision 7A 1973

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide the recommendations of CISPR on matters relating to radio interference and its suppression.

Comments: None

Document #: CISPR 8-1969

Title: *Reports and Study Questions of the CISPR*

Key Word(s): CISPR

Effective Date: 1982

Revision Level: Revision 8D 1982
Revision 8C 1980
Revision 8B 1975
Revision 8A 1973

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to document reports and study questions of the CISPR.

Comments: None

Document #: CISPR 9-1978

Title: *CISPR Limits of Radio Interference and Leakage Currents According to CISPR and National Regulations*

Key Word(s): Radio Interference Limits

Effective Date: 1978

Revision Level: Fourth Revision

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide the limits of interference, in tabular form, recommended by the CISPR for national adoption; full texts are given in CISPR Publication 7. National limits of interference are also listed where these are the same.

Comments: None

Document #: CISPR 10-1989

Title: *Organization, Rules, and Procedures of the CISPR*

Key Word(s): CISPR

Effective Date: 1989

Revision Level: Third Edition 1989
Second Edition 1981
First Edition 1976

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide the organization, rules and procedures of the CISPR.

Comments: None

Document #: CISPR 11-1990

Title: *Limits and Methods of Measuring Electromagnetic Disturbance Characteristics of Industrial, Scientific, and Medical (ISM) Radio Frequency Equipment (Excluding Surgical; Diathermy Apparatus)*

Key Word(s): Medical Equipment, ISM

Effective Date: 1990

Revision Level: Second Edition 1990
 Amendment 1 1976
 First Edition 1971

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide limits and methods of measuring EMC characteristics of ISM equipment.

Comments: None

Document #: CISPR 12-1990

Title: *Limits and Methods of Measurement of Radio Interference Characteristics of Ignition Systems of Motor Vehicles and Other Devices*

Key Word(s): Ignition Systems

Effective Date: 1990

Revision Level: Third Edition 1990
 Second Edition 1978
 First Edition 1975

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide limits and methods of measurement for the radiation of electromagnetic energy from motor vehicles and other devices equipped with internal combustion engines that may cause interference to radio reception.

Comments: None

Document #: CISPR 13-1990

Title: *Limits and Methods of Measurement of Radio Interference Characteristics of Sound and Television Receivers*

Key Word(s): TV

Effective Date: 1990

Revision Level: Third Edition 1990
 Amendment 1 1983
 Second Edition 1978
 First Edition 1975

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide limits of measurements of radio interference characteristics of sound and television receivers.

Comments: CISPR 13-1990 has replaced IEC 106-83.

Document #: CISPR 14-1990

Title: *Limits and Methods of Measurement of Radio Interference Characteristics of Household Electrical Appliances, Portable Tools, and Similar Electrical Apparatus*

Key Word(s): Household Appliances

Effective Date: 1990

Revision Level: Third Edition 1990
 Second Edition 1988
 Amendment 1 1980
 First Edition 1975

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide limits and methods of measuring radio interference characteristics of household electrical appliances, portable tools, and similar electrical apparatus.

Comments: None

Document #: CISPR 15-1985

Title: *Limits and Methods of Measurement of Radio Interference of Fluorescent Lamps and Luminaires*

Key Word(s): Fluorescent Lamp

Effective Date: 1989

Revision Level: Amendment 1 1989
Third Edition 1985
Second Edition 1981
First Edition 1975

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide limits and methods of measuring radio interference of fluorescent lamps and luminaires.

Comments: None

Document #: CISPR 16-1987

Title: *Specification for Radio Interference Measuring Apparatus and Measurement Methods, Second Edition*

Key Word(s): Radio Interference Measurement Methods

Effective Date: 1987

Revision Level: Second Edition 1987
Amendment 2 1983
Amendment 1 1980
First Edition 1977

Supersedence: This document supersedes CISPR documents 1 through 6.

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide specifications for radio interference measuring apparatus and measurement methods.

Comments: None

Document #: CISPR 17-1981

Title: *Methods of Measurement of the Suppression Characteristics of Passive Radio Interference Filters and Suppression Components*

Key Word(s): Filters

Effective Date: 1981

Revision Level: First Edition 1981

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide methods of measuring the suppression characteristics of passive radio interference filters and suppression components.

Comments: None

Document #: CISPR 18-1-1982

Title: *Radio Interference Characteristics of Overhead Power Lines and High Voltage Equipment, Description of Phenomena, Part 1*

Key Word(s): Power Lines

Effective Date: 1982

Revision Level: First Edition 1982

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of Part 1 of this document is to describe the radio interference characteristics of overhead power lines and high-voltage equipment.

Comments: None

Document #: CISPR 18-2-1986

Title: *Radio Interference Characteristics of Overhead Power Lines and High Voltage Equipment Part 2: Methods of Measurement and Procedures for Determining Limits*

Key Word(s): Power Lines

Effective Date: 1986

Revision Level: First Edition 1986

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of Part 2 of this document is to provide methods of measurement and procedures for determining limits for radio interference characteristics of overhead power lines and high-voltage equipment.

Comments: None

Document #: CISPR 18-3-1986

Title: *Radio Interference Characteristics of Overhead Power Lines and High Voltage Equipment Part 3: Code of Practice for Minimizing the Generation of Radio Noise*

Key Word(s): Power Lines

Effective Date: 1986

Revision Level: First Edition 1986

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of Part 3 of this document is to provide a code of practice for minimizing the generation of radio noise from power lines and high-voltage equipment.

Comments: None

Document #: CISPR 19-1983

Title: *Guidance on the Use of Substitution Method for Measurement of Radiation from Microwave Ovens for Frequencies Above 1 GHz*

Key Word(s): Microwave Ovens

Effective Date: 1983

Revision Level: First Edition 1983

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide guidance on the use of a substitution method for measurement of radiation from microwave ovens for frequencies above 1 GHz.

Comments: None

Document #: CISPR 20-1985

Title: *Measurement of the Immunity of Sound and Television Broadcast Receivers and Associated Equipment in the Frequency Range from 1.5 to 30 MHz by the Current Injection Method, Guidance on Immunity Requirements for the Reduction of Interference Caused by Transmitters in the Frequency Range of 26 MHz to 30 MHz*

Key Word(s): TV

Effective Date: 1985

Revision Level: First Edition 1985

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide measurement of the immunity of sound and television broadcast receivers and associated equipment in the frequency ranges from 1.5 to 30 MHz by the current injection method and to provide guidance on requirements for the reduction of interference caused by radio transmitters in the frequency range from 26 to 30 MHz.

Comments: None

Document #: CISPR 21-1985

Title: *Interference to Mobile Radio Communications in the Presence of Impulsive Noise: Method of Judging Degradation and Measures to Improve Performance*

Key Word(s): Mobile Radio

Effective Date: 1985

Revision Level: First Edition 1985

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide a method of judging degradation and measures to improve performance of mobile radio communications in the presence of impulsive noise interference.

Comments: None

Document #: CISPR 22-1985

Title: *Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment*

Key Word(s): Information Technology Equipment

Effective Date: 1985

Revision Level: First Edition 1985

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide limits and methods of measuring radio interference characteristics of information technology equipment.

Comments: None

Document #: CISPR 23-1987

Title: *Determination of Limits of Radio Interference for Industrial Scientific and Medical Equipment*

Key Word(s): ISM Equipment, Medical Equipment

Effective Date: 1987

Revision Level: First Edition 1987

Supersedence: NA

Applicability: This document is applicable for use in the international EMC community.

Purpose: The purpose of this document is to provide a determination of limits of radio interference for industrial, scientific, and medical equipment.

Comments: None

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